ROADS AND STREETS

DECEMBER 1946

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DETROIT

THERE'S A *Timken Rock Bit* FOR PRACTICALLY EVERY KIND OF ROCK

The M series; an intermediate bit to the H and D series, designed largely for mining with heavy-duty equipment.

The T series; a bit used in soft formations, such as limestone and sandstone.

The D series; a bit used with heavy drilling machines and large section drill steels.

The F series; a sturdy bit designed to achieve fast drilling by virtue of its small gauge.

The H series; a general purpose bit for light and medium weight drills adaptable to any popular hollow drill steel section.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
ROCK BITS

Introduced fourteen years ago, the Timken Rock Bit of today bears a remarkably close resemblance to those on the market in 1932. Improvements have been made—streamlined then, it's more streamlined now; heavy wing sections have become heavier—but basically it's the same design. Fourteen years' experience has confirmed its correctness.

THE TIMKEN ROLLER BEARING COMPANY, CANTON 6, OHIO

Roads that keep a smile here

Contractors have been building them with

OHIO OIL ASPHALTS

for over 20 years

Smooth, safe-surface roads... long lasting... easily maintained... roads that keep traffic happy, keep up contractors' reputations, satisfy conscientious public officials. They're roads built with OHIO OIL COMPANY ASPHALTS, chosen for long range economy and basic highway safety. The Ohio Oil Company manufactures a complete line of all grades of rapid, medium and slow-curing asphalts and asphalt cements.

THE OHIO OIL COMPANY

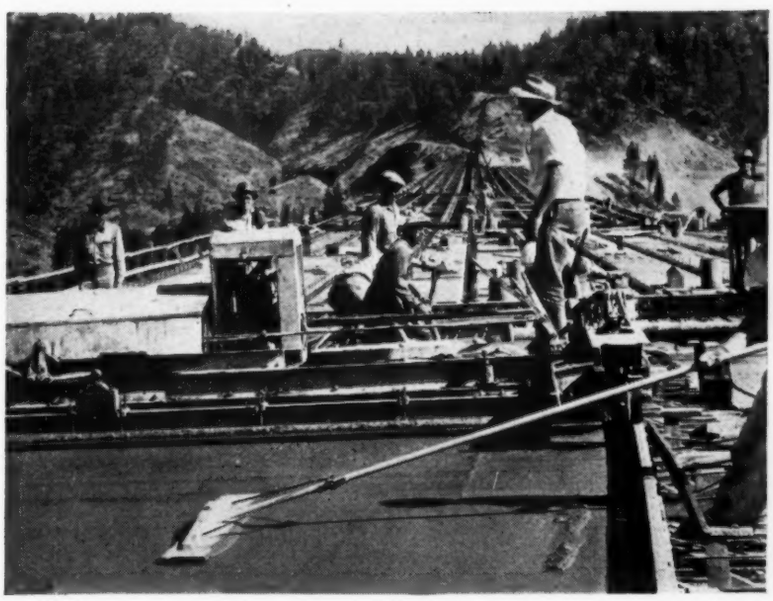
ASPHALT DEPARTMENT: Robinson, Illinois • Lovell, Wyoming

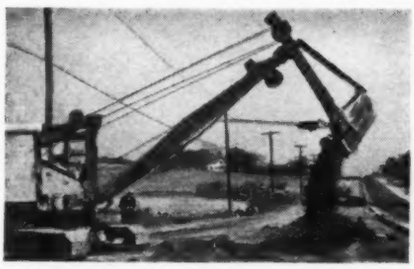
Producers of Petroleum since 1887

RUGGED STEELS... for RUGGED JOBS

That's what highway contractors get when they buy from Bethlehem's complete line of road-steel products. Whether it's steel to help in building the highway—or steel that becomes a permanent part of the road or right-of-way—there's a Bethlehem steel product to do the job.

Which is why so many contractors today are turning to Bethlehem Road Steel Service. They know that the products they get will be designed and built for rugged, lasting performance. And, what's just as important these days, they know that they get service that's helpful and reliable.





RUGGED WIRE ROPE

For equipment such as shovels, dragline excavators, ditchers, cranes, etc., you can't buy a tougher or stronger rope than Bethlehem's Purple Strand, made of Improved Plow Steel. And where conditions warrant—as they often will—buy it preformed (Form-Set is our name for it) so that it's less apt to kink or loop, won't bristle, and stands bending fatigue better, thus lasting longer.

RUGGED DRILL STEEL

If you need drill steel, for jobs like making shot holes, buy Bethlehem Hollow Drill Steel, rolled from steel with the toughness and hardening characteristics that this type of work requires. It's suitable for both forged-on bits and for fabricated rods with detachable bits. Bethlehem also supplies Solid Drill Steel for blacksmithing purposes, such as pinch bars, moil points, chisels.

RUGGED GUARD RAIL

Bethlehem produces a complete line of highway guard rail, with posts, brackets and other fittings, to comply with any state specifications. The rugged Cable Guard Rail, made of heavily galvanized strand, and the strong, resilient Cable Bracket mounted on a Bethlehem Steel Guard Post make a combination that's hard to beat. And where specifications call for even greater strength, there's the Safety-Beam Guard Rail, a smooth-surfaced, heavy-gauge steel rail which absorbs the impact of a runaway vehicle, tending to redirect it parallel to the rail. Especially adapted for bridges and bridge approaches.

LEADING BETHLEHEM HIGHWAY PRODUCTS

Road Joints — Reinforcing Bars — Bar Mats — Guard Rail
Guard Rail Posts and Brackets — Wire Rope and Strand — Pipe
Hollow Drill Steel — Structural Steel — Sheet and H-piling
Corrugated Sheets — Tie Rods, Spikes, Bolts and Nuts

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

STEEL for HIGHWAYS

★ BETHLEHEM STEEL ★

ROADS AND STREETS

DECEMBER, 1946 . . • VOL. 89 • No. 12

With Roads and Streets Have Been Combined Good Roads Magazine And Engineering & Contracting

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"Contractors at Work" Series
Continuing with photo-stories of interesting road, street and airfield construction projects, as seen by the R and S editors

Adding Two More Lanes to the George Washington Bridge
New York's big suspension bridge was the scene of a concreting operation involving precast concrete form blocks

Field Survey Methods on Urban Expressways
Detailed account of procedure which is saving time and manpower and assuring accurate right-of-way location and property tie-ins at Los Angeles

Use of Asphalt Surface Heaters and Heater-Planers in California
Los Angeles and California state practice with these maintenance units reviewed

Fall and Winter Graveling Programs in Michigan Counties Catching Up on Pavement Striping
A nationwide summary of state highway departments' practices and problems

What They Talked About at the Highway Research Board and AASHO Meetings
Staff summaries of these important conventions and other national organization meetings to take place this winter

Other practical articles on construction methods, contractor problems, maintenance, planning, design, traffic, equipment maintenance.

A magazine devoted to the design, construction, maintenance and operation of highways, streets, bridges, bridge foundations and grade separations, and to the construction and maintenance of airports.

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22 West Maple Street, Chicago 10, Ill.

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TL-20 FEATURES

Unit Assembly
5 Identical Clutches
Anti-Friction Bearings
Oil-Enclosed Cut Gears
Independent Cable Shovel Crowd

That make for yardage
Average 600 yds. of gravel per 10 hour day
...and satisfaction
"Has plenty of guts and reach"
"A revelation in the ½ yd. shovel field"
"Use it to strip overburden, too—"
"Has more than satisfied our hopes"
LORAIN
MILLER BROS.
MILLER 46
BROS.

● This TL-20 shovel is writing testimonials by the truck load daily in the gravel pit operation of Miller Brothers, West Milton, Ohio. Here's proof that the many new design features of the Lorain TL-20 are establishing new performance standards for shovels and cranes in the ½ yd. class.

How many *extra* yards can you use in 1947? For complete information on the new TL-20, call or write your local Thew-Lorain distributor.

The Thew Shovel Company • Lorain, Ohio

The NEW Lorain TL 20

Always Your

INTERNATIONAL

DIESEL CRAWLERS

for Dirt Moving

WHERE real dirt-moving records are being made, there's a Diesel crawler tractor doing the heavy work. If it isn't doing the whole job of powering the digging, carrying and spreading, it pushes other rigs through the loading zone to get capacity loads rolling quickly.

Whether hauls are long or short, Diesel Crawlers are in there to make the job move along on schedule. Without them, many a vaunted record would not have materialized.

Because International Diesel Crawlers are geared to the earth with maximum ground contact, their power to push or pull is totally effective, even on soft footing. And because International Diesels have great hang-on, they go through where many another prime mover would stall.

Yes, your best bet is International Diesel Crawlers for all earth-moving power. Advanced engineering gives them long life, smooth performance, unit construction for easy and time-saving service and a positive instant starting system. Their rugged build assures true alignment of all moving parts and an unusual ability to absorb punishment. Their full-Diesel engines assure matchless operating economy. Their excellent balance and maneuverability give them sure-footed safety and quick response to all performance demands.

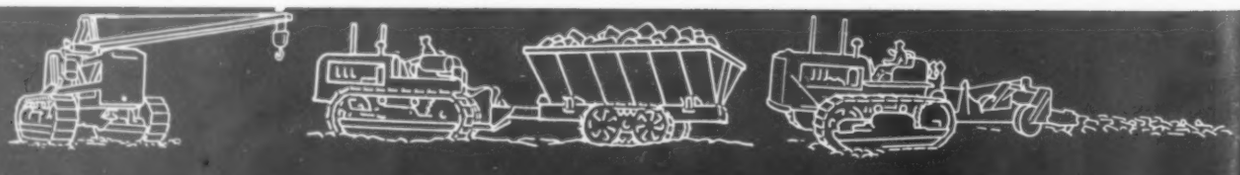
Call on the International Industrial Power Distributor near you for facts and figures on International Diesel Tractors, Power Units and matched equipment. He'll be a valuable friend to have when competitive days require closer study of costs and performance.

Industrial Power Division

INTERNATIONAL HARVESTER COMPANY

180 North Michigan Avenue Chicago 1, Illinois

INTERNATIONAL *Industrial Power*



Best Bet...

INTERNATIONAL HARVESTER

CRAWLER TRACTORS

POWER UNITS

WHEEL TRACTORS

Steam Hot Water or Heat ..

-- at Low Cost for every yard need

● Profitable, uninterrupted yard operation in cold weather calls for steam — hot water or heat — for many purposes.

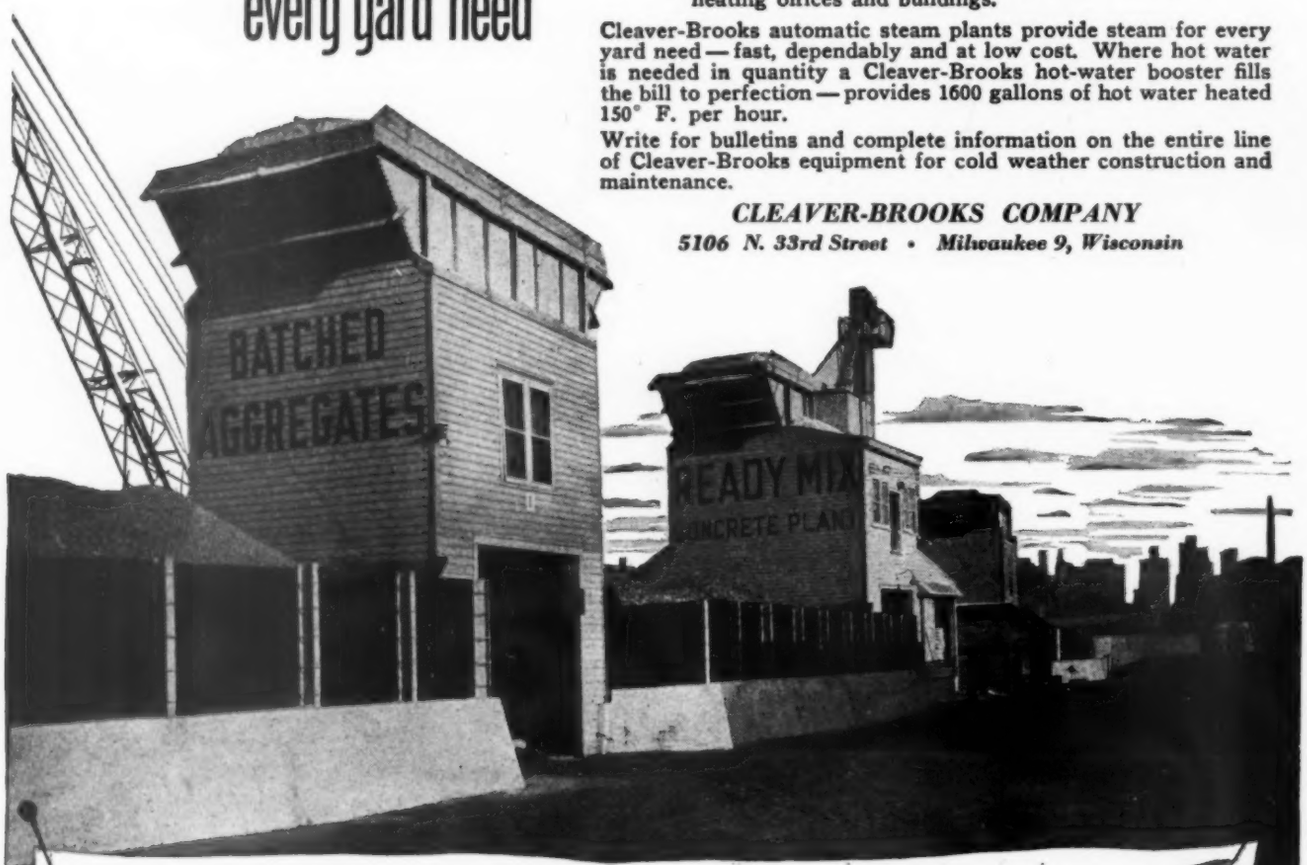
- thawing and heating aggregate in stock piles or bins — for winter concreting.
- heating water for central mixing plants.
- heating asphalt, oils, bituminous material in tank cars or storage tanks.
- steam or hot water for cleaning machinery — heating offices and buildings.

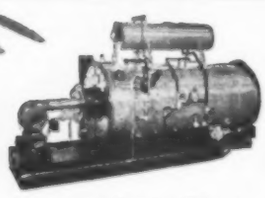
Cleaver-Brooks automatic steam plants provide steam for every yard need — fast, dependably and at low cost. Where hot water is needed in quantity a Cleaver-Brooks hot-water booster fills the bill to perfection — provides 1600 gallons of hot water heated 150° F. per hour.

Write for bulletins and complete information on the entire line of Cleaver-Brooks equipment for cold weather construction and maintenance.

CLEAVER-BROOKS COMPANY

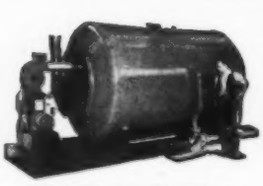
5106 N. 33rd Street • Milwaukee 9, Wisconsin





Automatic Steam Plants

Completely self contained; highly efficient; require only simple piping connections to place in operation. Fully automatic fuel-oil burner; condensate recovery and feed water pumping system; no stack needed, sizes from 20 to 500 h.p.; pressures 15 to 200 lbs.



Hot Water Boosters

Oil-fired; fully automatic or manual operation; no licensed engineer needed; two capacity sizes: 3000 gals. storage tank for 1600 gals. of water heated 150° F. per hour; 1500 gals. storage tank for 800 gals. of water heated 150° F. per hour.

Portable Pumping Boosters

Heats bituminous material by direct firing in one operation, loading directly to distributor, relay truck or returning to tank car. Two sizes, truck mounting or 4-wheel trailer.

Portable Tank-Car Heaters

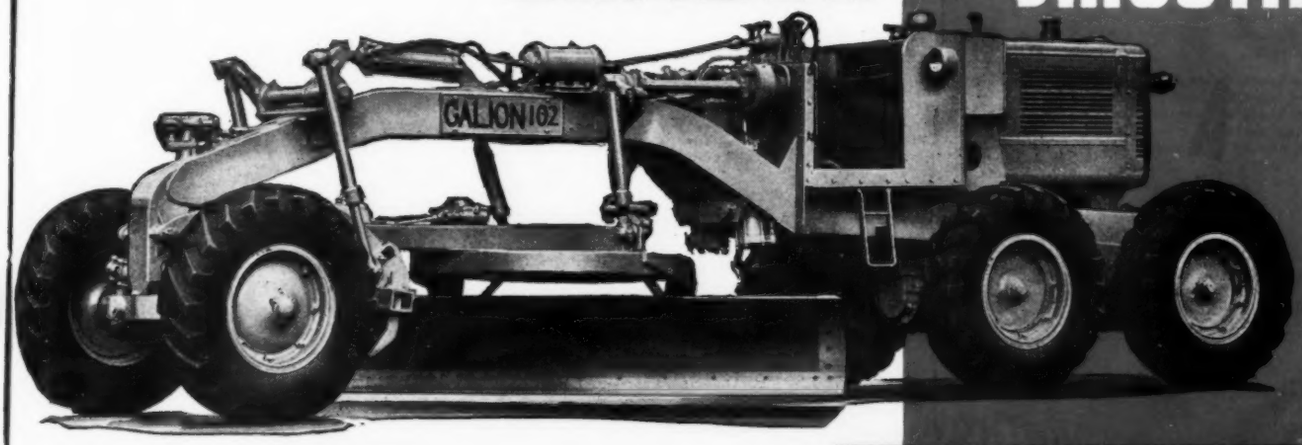
Available in 2 and 3 tank-car sizes. Oil-fired with exclusive four-pass flue travel; dry-coil steam condensate return under pressure — no water or heat loss. Provides a portable source of steam wherever needed.

Cleaver-Brooks

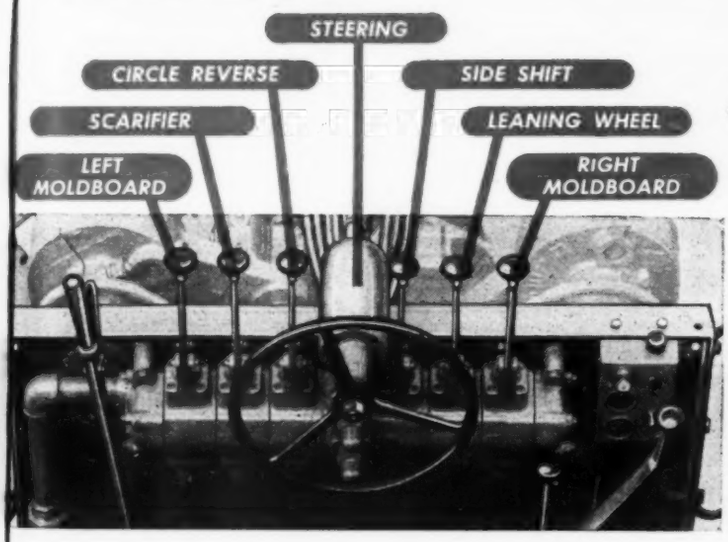
Pioneers and Originators of ★TANK CAR HEATERS ★BITUMINOUS BOOSTERS ★AUTOMATIC STEAM-PLANTS

GALION 102 MOTOR GRADER

Easiest, simplest and smoothest



Because it is FULL HYDRAULIC



The FULL Hydraulic finger-tip Control on GALION MOTOR GRADERS saves time—gets jobs done quicker . . . Permits precise adjustments—does more work . . . Reduces operator fatigue—encourages more alertness on the job.

CENTRALIZED CONTROLS FINGER-TIP OPERATION

All hydraulic control levers are conveniently grouped for ease of operation. The only effort required is finger-tip pressure.

DEPENDABLE and ECONOMICAL

A low pressure hydraulic system is used. Two safety valves automatically prevent over-loading or damaging of the machine. Dependable and economical Grader operation is assured.

See your nearest GALION distributor or write for Catalog No. 290.

Galion Features That Assure Top Performance

- Large front tires — same as rear . . . .
- Combination hand and hydraulic steering .
- Rugged box-type main frame . . . . .
- Gear-type, four-wheel tandem drive . . .
- Full hydraulic control — low pressure system .
- Heavy front axle construction . . . . .
- Blade pressure of 13,500 lbs. . . . . .
- Powerful, quick starting, full Diesel Motor .

The GALION IRON WORKS & MFG. CO.

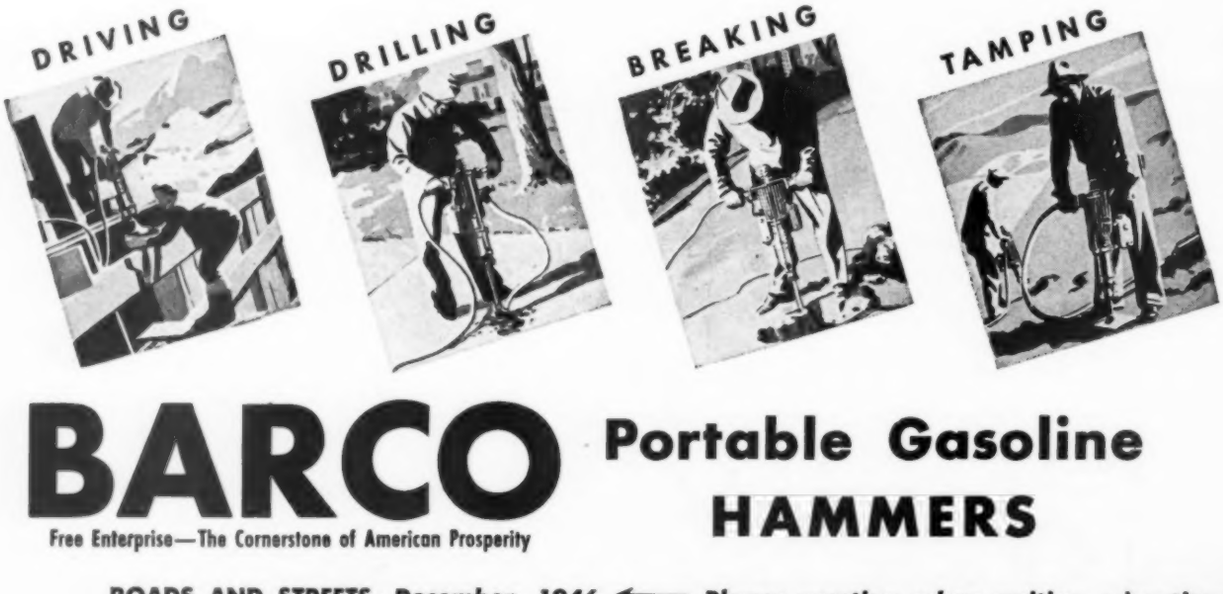
General and Export Sales Offices

Galion, Ohio, U. S. A.

GALION IRON WORKS hydraulic

GRADERS · ROLLERS

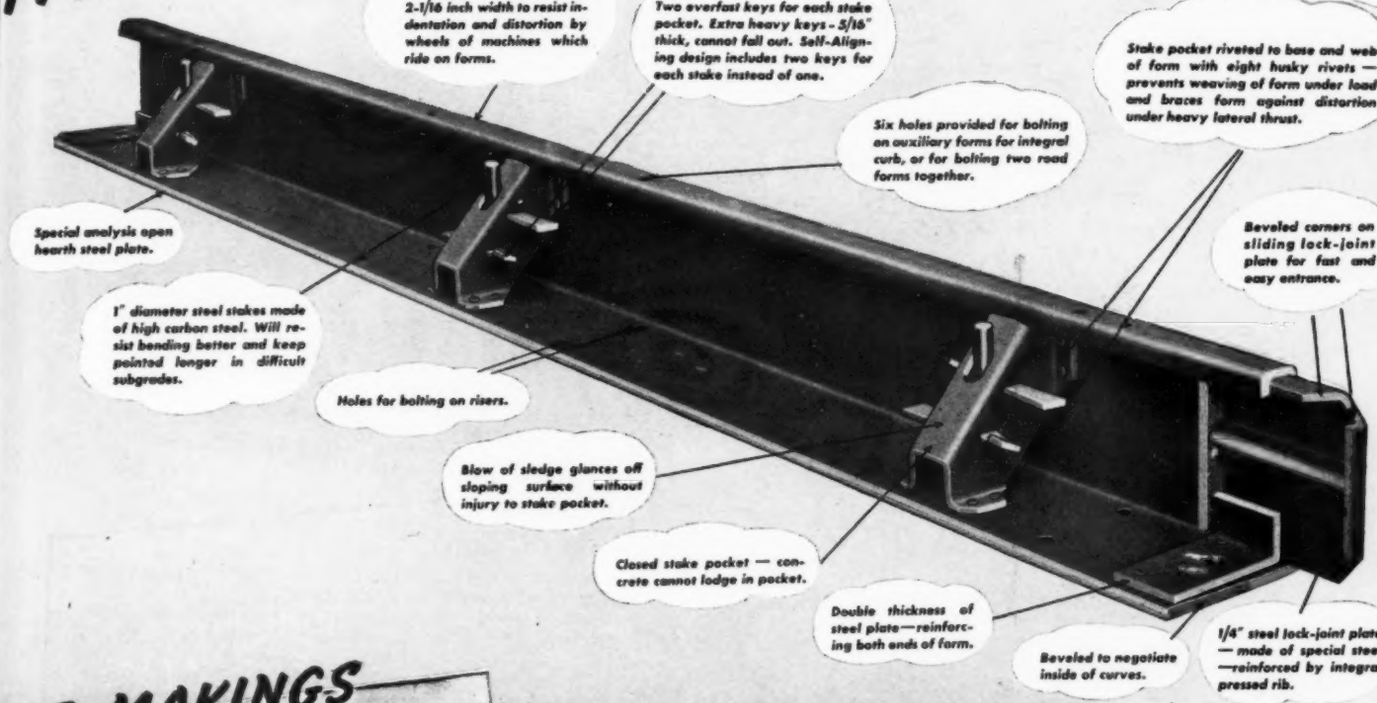
Knocking hours off schedule, cutting operating costs—that's what Barco Hammers are doing in every section of the country. Contractors like their speed and economy, workmen like their light weight, easy operation — their efficiency under tough conditions at hard-to-reach spots. And for versatility, Barco has eleven special tool attachments, each instantly interchangeable. Write to Barco Manufacturing Co., Not Inc., 1815 Winnemac Avenue, Chicago 40, Illinois.



BARCO Portable Gasoline HAMMERS

Free Enterprise—The Cornerstone of American Prosperity

Expect and get BLUE RIBBON PERFORMANCE From Improved PAVING FORMS


Top flange of form held to 2-1/16 inch width to resist indentation and distortion by wheels of machines which ride on forms.
Two overfast keys for each stake pocket. Extra heavy keys - 5/16" thick, cannot fall out. Self-Aligning design includes two keys for each stake instead of one.
Stake pocket riveted to base and web of form with eight husky rivets — prevents weaving of form under load and braces form against distortion under heavy lateral thrust.
Six holes provided for bolting on auxiliary forms for integral curb, or for bolting two road forms together.
Special analysis open hearth steel plate.
Beveled corners on sliding lock-joint plate for fast and easy entrance.
1" diameter steel stakes made of high carbon steel. Will resist bending better and keep pointed longer in difficult subgrades.
Holes for bolting on risers.
Blow of sledge glances off sloping surface without injury to stake pocket.
Closed stake pocket — concrete cannot lodge in pocket.
Double thickness of steel plate—reinforcing both ends of form.
Beveled to negotiate inside of curves.
1/4" steel lock-joint plate — made of special steel —reinforced by integral pressed rib.

THE MAKINGS

of more than 000,000 feet of Blaw-Knox paving forms which went to War.

Part of a stock pile of steel plates in the Blaw-Knox yards during the war period.

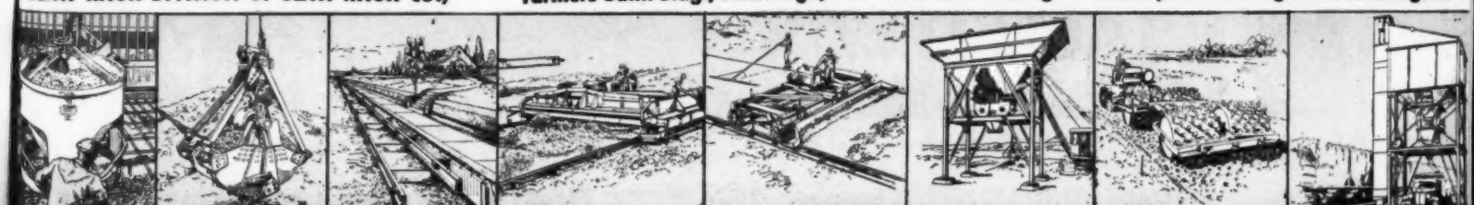
The choice of men who do high speed concrete paving of roads and airports, who appreciate the blue ribbon performance they get from the improved Blaw-Knox Self-Aligning Paving Form.

- It's the only self-aligning paving form on the market, and can be set faster and more accurately.
- Form alignment is undisturbed when stakes bend or if the stake hits an obstruction.
- Less experienced form setters can be used.
- Improved reinforcement for rigidity and durability. Husky rivets and no countersinking of holes in form plate.
- Available in 5 gage (7/32") or 1/4" special analysis open hearth steel plate.

Study the features of Blaw-Knox Paving Forms — learn more about them in Bulletin No. 2037 (we'll send you a copy) — know all the desirable factors that insure faster, better and cheaper form setting on your paving job.

BLAW-KNOX CONSTRUCTION EQUIPMENT

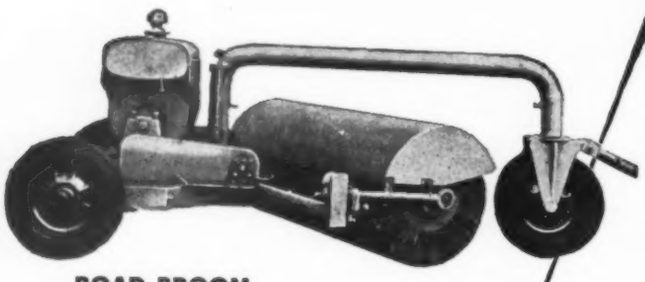
BLAW-KNOX DIVISION OF BLAW-KNOX CO., Farmers Bank Bldg., Pittsburgh, Pa. • New York • Chicago • Philadelphia • Birmingham • Washington



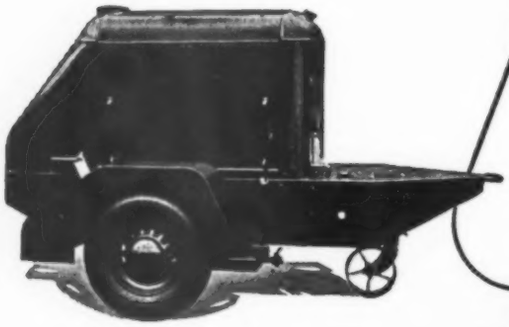
CONCRETE BUCKETS | CLAMSHELL BUCKETS | STEEL STREET FORMS | PAVING SPREADERS FOR ROADS AND AIRPORTS | FINISHING MACHINES FOR ROADS AND AIRPORTS | AGGREGATE BATCHING PLANTS | SHEEPSFOOT TAMPING ROLLERS | BULK CEMENT PLANTS

IT'S NOT WHAT YOU LIKE TO DO - BUT WHAT YOU DO THAT COUNTS

"SPRAY MASTER"
PRESSURE DISTRIBUTOR



ROAD BROOM



"TANKAR"
STEAM HEATER

When those big Black Top Road, Highway or Airport Runway jobs are ready for Construction or Repair—do you *like to do* a modern, efficient job—or do you *do* a modern efficient job?

If you have the right Equipment, engineered, tested and proven like Littleford "Spray Master" Pressure Distributors, Road Brooms, "Tankar" Steam Heaters, Supply Tanks, then there's no reason for not doing a perfect Black Top Job.

Let's take a look at these Littleford Units and see why they're efficient and modern. The "Spray Master" with Full Circulating Vacuum Flow Spray Bar circulates the material by Vacuum, not pressure. Road Brooms have Hydraulic Tension Control on the Brush for adjusting Brush tension on Road Surface. "Tankar" Steam Heater produces steam in two minutes' time. Supply Tanks can be built without the use of a frame—known as Littleford Frameless Constructed tanks. It's what you *do* that counts and you can count on Littleford Black Top Road Equipment.

SUPPLY TANK

LB — BLACK TOP ROAD MAINTENANCE EQUIPMENT — SINCE · 1900

LITTLEFORD

LITTLEFORD BROS., Inc.

454 E. PEARL ST., CINCINNATI 2, OHIO

FWD HIGHWAY TRUCKS

CLEAR ROADS FASTER

Snow-fighting is a highly specialized business. FWD four-wheel-drive trucks have the power, driving-force, ruggedness, and all-wheel traction required to bust through heavy snow-banks, clear streets and highways fast, and open the way for traffic that must be kept moving.

FWDs have proved their value in snow removal, with all types of snow-plows, in the toughest of snow fighting assignments. When an FWD-powered plow busts into a snow bank, you can be sure it will go through. On many other road jobs that are tough, FWDs are just as outstanding in performance as they are in snow-fighting.

For dependable all-year 'round truck service, see the nearest FWD Distributor, or write to THE FOUR WHEEL DRIVE AUTO CO., Clintonville, Wisconsin.

Canadian Factory: KITCHENER, ONTARIO

Powerful FWD Model YU, with V-plow and wing, mounted on an all-season highway maintenance truck body, with hydraulic hoist . . . a popular snow-bank-buster that does many other heavy-duty highway construction and maintenance jobs as well.

FWD

America's Foremost Heavy-Duty Truck

LOW-COST COUNTY ROADS

CATERPILLAR

REG. U.S. PAT. OFF.

ENGINES • TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT

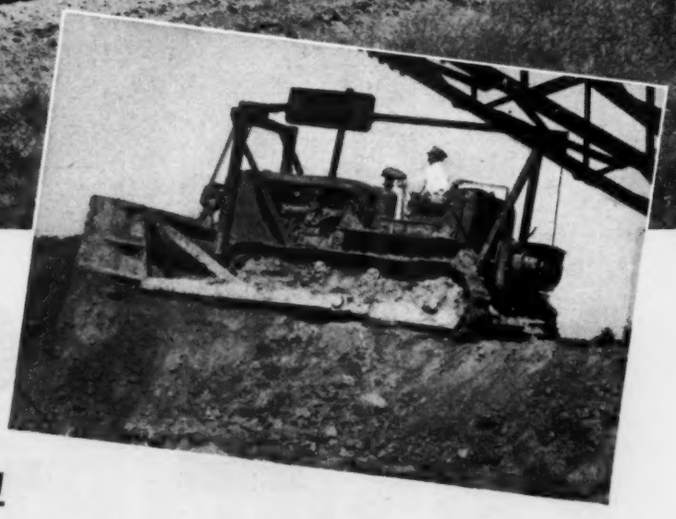
1 DIESEL D8 TRACTOR
1 DIESEL No. 12 MOTOR GRADER
6 DW10 WHEEL TRACTORS
6 W10 WAGONS

The above machines comprise the hard-hitting, fast-working, economical "Caterpillar" equipment that is converting Shelby County (Tenn.) roads from mud to smooth, compact, easy-to-travel highways. This equipment is the kind whose initial cost is only "a drop in the bucket" in relation to the value of the work it can do year after year. Its low operating cost, long life, and the excellent dealer service behind it—all contribute further economies that make cheerful reading for taxpayers.

Your "Caterpillar" dealer has a complete line of matched earthmoving equipment—and some helpful suggestions—to give your community the *lowest costs on earth.*

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

Pictures show a portion of Shelby County's "Caterpillar" equipment working on road-building project near Memphis. Job includes a 20-mile haul of gravel from pit to operation.



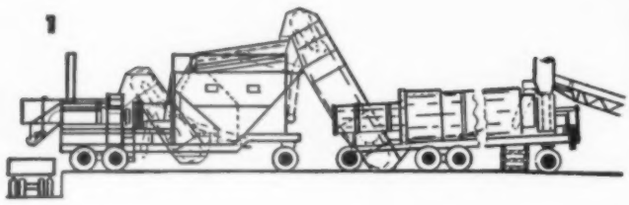
DIESEL

—FOR LOWEST COSTS ON EARTH

Continuflo Asphalt Plant

WITH ONLY 2 MAIN UNITS

1



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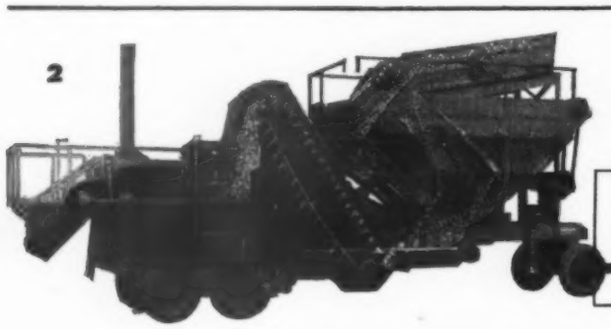


THE NEW *Continuflo* Central Mix Asphalt Plant brings you the most portable and compact continuous process asphalt plant ever built. It is recognized as one of the great developments in asphalt equipment.

Consisting of only 2 main units—the mixer and the drier—*Continuflo* is easier to move . . . easier to locate on the job.

In *Continuflo*, all mixing operations are fully automatic. The asphalt metering pump is interlocked with the aggregate feeder to provide correct proportioning of bitumen and aggregate. There is no variation in the finished product. The human element is out—the correct mix is assured!

Write for complete information about *Continuflo*—the year's outstanding development in asphalt equipment.

PIONEER ENGINEERING WORKS
1515 CENTRAL AVENUE • MINNEAPOLIS 13, MINNESOTA

1 *IN A STEADY, CONTINUOUS FLOW* aggregate passes from the feeder conveyor through the drier, hot elevator and gradation unit to the pugmill.

2 *A COMPACT PLANT*—Gradation and Mixing Unit combines on one truck the gradation screen, proportioning unit, transfer elevator and mixer.

Engineers and Manufacturers for Pit, Mine, Quarry, Bituminous, Materials Handling

PLAN WITH

Pioneer

ENGINEERING WORKS

IT'S HERE!...

THE MOST ADVANCED TRACTOR IN ITS POWER CLASS

Allis-Chalmers HD-5

NOW! . . . A *NEW* SMALLER TRACTOR WITH BIG TRACTOR DESIGN, BALANCE AND STAMINA

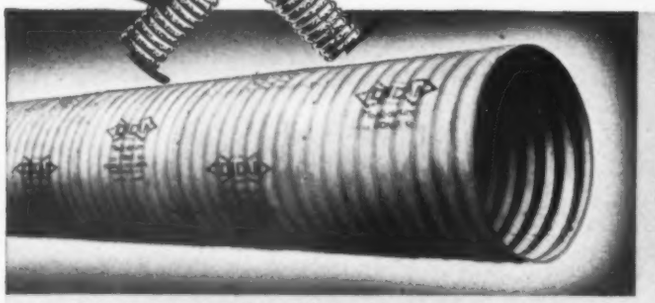
- Engineered Completely New Throughout
- 37.4 Drawbar hp.
- Five Speeds — 1.46 to 5.47 m.p.h.
- Weight: 44-inch Tread 10,750 lbs.
  60-inch Tread 11,250 lbs.
- 1,000 Hour Lubrication — Truck Wheels, Idlers, Support Rollers
- 2-Cycle Diesel Power
- Full Visibility; Comfortable Seat; Readily Accessible Controls
- Simplified Maintenance
- More Traction, More Ground Contact, Better Balance

IT'S RUGGED! — IT'S TOUGH! — IT'S DEPENDABLE!

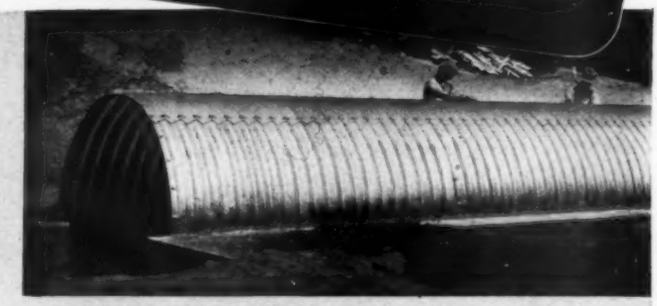
ALLIS-CHALMERS

TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

Call your TONCAN IRON Man for these Drainage Products

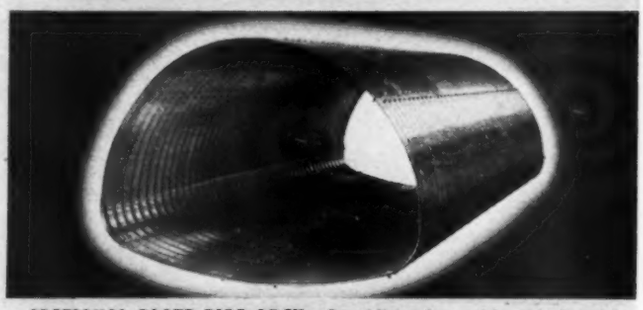


CORRUGATED METAL PIPE—6″ to 84″ diameters. Any length in multiples of 2 ft. Gages No. 16 to No. 8. Galvanized with or without bituminous coating. Complete line of standard or special fittings.

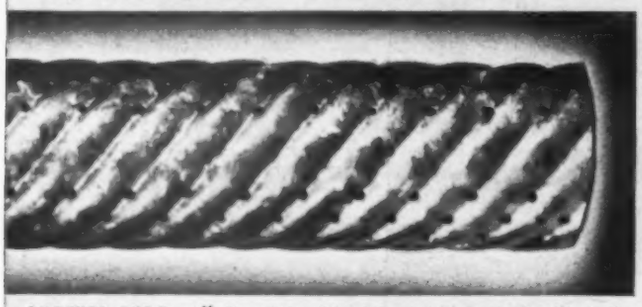


SECTIONAL PLATE ARCHES—Wide range of spans and rises. Made in No. 7 to No. 1 gage. Base and headwall materials determined by local conditions.

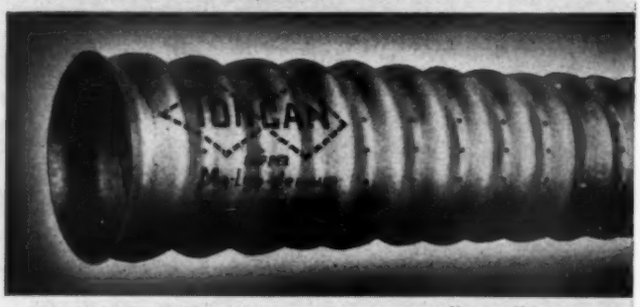
SECTIONAL PLATE PIPE—Field-erected using individual plates and special bolts. 5 to 15 ft. diameters. No. 7 to No. 1 gage. Corrugations designed for maximum strength.



SECTIONAL PLATE PIPE-ARCH—Provides a low wide arch 6 to 15 feet in span. Shipped knocked down. Nut and bolt assembly assures fast erection on the job. Made in No. 7 to No. 1 gage Toncan Iron.



CORWEL PIPE—6″ diameter. No. 18 or 16 gage. Perforated or non-perforated. Lengths to 24 ft. Helical corrugations. Galvanized after fabrication.



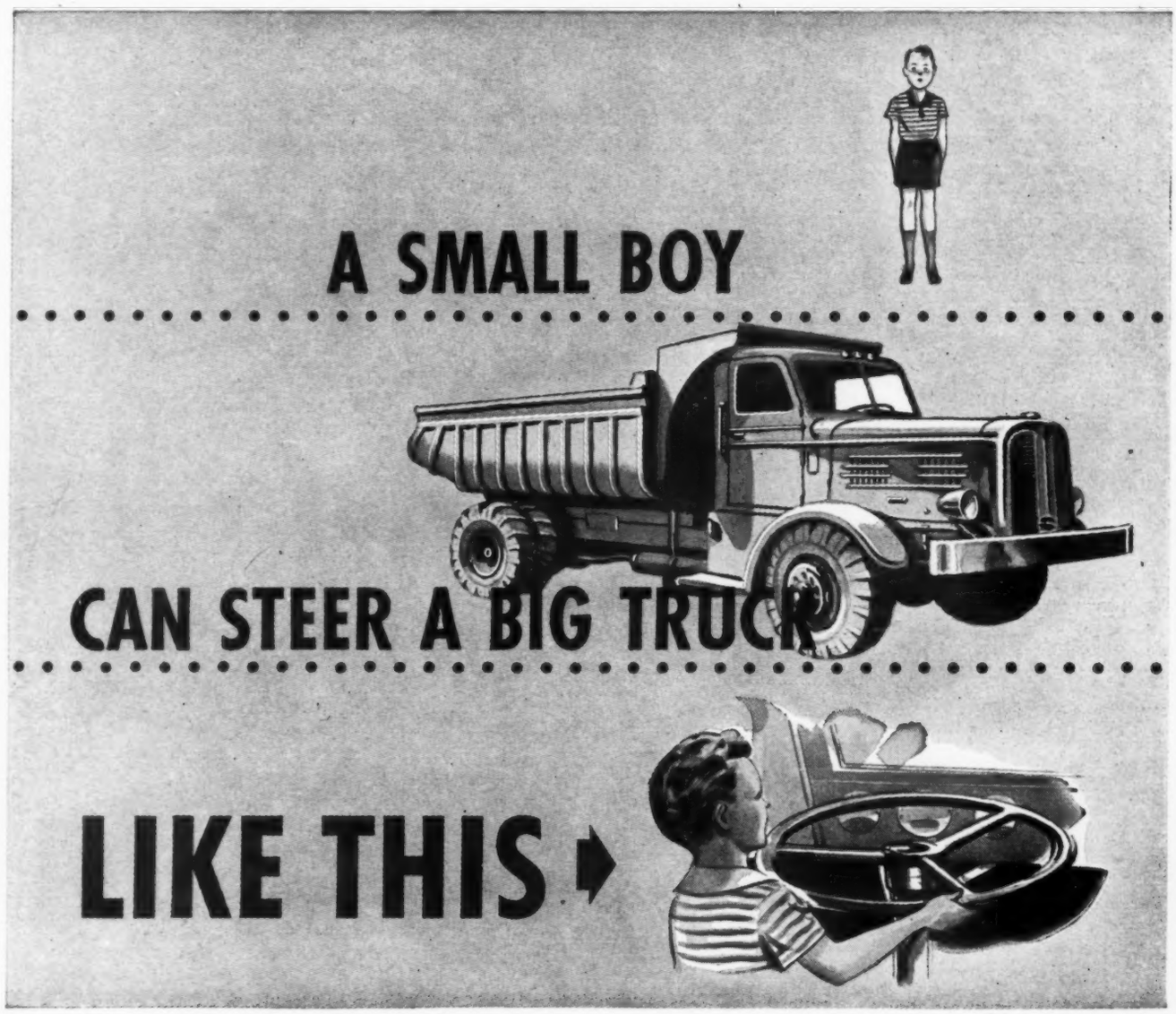
PERFORATED METAL PIPE—For subdrainage. 6″ to 30″ diameters. Lengths in 2 ft. multiples. No. 16 or 14 gage. Complete line of standard or special fittings.

All Are Made From Rust-Resistant Toncan Iron

Each one of these efficient drainage structures is made from Toncan Iron. This durable material is an alloy of highly refined open hearth iron, to which has been added twice as much copper as found in copper-bearing irons and steels, plus molybdenum. That's why these drainage structures made from Toncan Iron resist rust and corrosion caused by soil, water and sewage.

When planning drainage structures, call your Toncan Iron Man. He will be able to point the way to substantial savings in time and money.

TONCAN CULVERT MANUFACTURERS' ASSOCIATION
CLEVELAND 14, OHIO
Toncan Iron...A product of Republic Steel Corporation

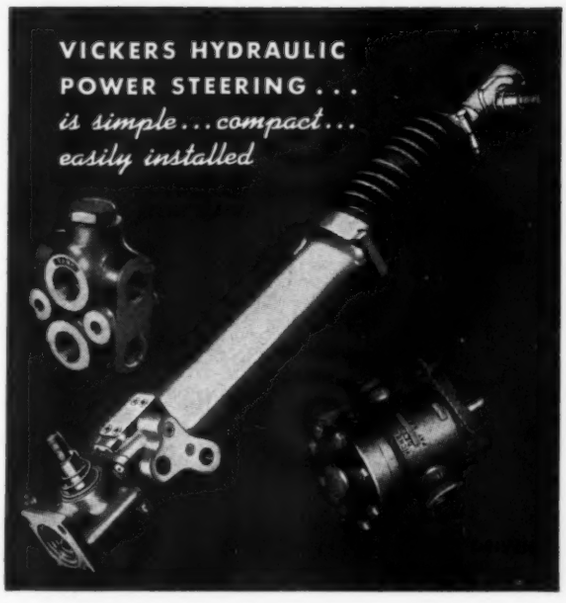


with VICKERS Hydraulic POWER STEERING

We don't expect a small boy to drive a big truck, but his strength is many times equal to the steering effort required if the truck has Vickers Hydraulic Power Steering. The steering wheel turns with effortless ease, and the front wheels always follow *exactly*.

Moreover, no matter how rough the ground, no road shock can get to the driver. The steering wheel cannot spin, or jerk—the vehicle can be driven over the curb or through sand with no "fight" from the wheel. A flat tire will not cause swerving. The driver is relieved of the most fatiguing part of his job—enabling him to work faster and longer with greater safety.

Vickers Hydraulic Power Steering is simple, compact, easy to apply to existing chassis designs. It has automatic protection against abuse and excessive steering reaction forces. Lubrication is automatic. Fifteen years of successful operating experience on trucks, buses, road machinery, etc. have proved the value of Vickers Hydraulic Power Steering. Write for Bulletin 44-30.



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Has what it takes—

. . . FOR HEAVY LOAD • STEADY PULL!

When the load is heavy and the pull steady, make sure the crankcase lubricant is designed to serve efficiently for hard service. Ineffective lubrication can promote costly mechanical breakdown.

Sinclair OPALINE TBT MOTOR OIL is made for continuous operation under heavy load at high engine temperatures. The crude is selected for stamina and refined for durability.

TBT is further fortified in the refining to provide what it takes to keep engines clean, hold crankcase accumulations down and prevent bearing corrosion. For top engine performance under heavy load and steady pull, choose OPALINE TBT MOTOR OIL . . . and for Diesels use Sinclair TENOL.

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FOR *FULL INFORMATION OR LUBRICATION COUNSEL WRITE* SINCLAIR REFINING COMPANY, 630 FIFTH AVENUE, NEW YORK 20, N. Y.

REGISTRATIONS *SHOW* IT—OPERATORS *KNOW* IT!

"FORD TRUCKS LAST LONGER!"

ONE big reason—

FORD ALL-WEATHER FAST WARM-UP

Ford trigger-fast engine starting often amazes first-time owners. It's mighty satisfying, but not nearly so important as Ford *fast warm-up!* Water does not circulate through the radiator until the engine is well warmed. This speeds the heating of water, cylinder block and oil. Hot exhaust gases are used to heat the intake manifold, speeding vaporization of fuel and minimizing crankcase oil dilution. Both these features reduce wear on cylinder walls, pistons, rings, bearings and valve mechanism. Yes, winter is tough on any truck, but Ford Trucks are engineered to take it.

Ford

Ford Heavy-Duty 2-ton, with dual-range rear axle and 6 x 8-foot Hydraulic Hoist Dump Body by Gar Wood Industries, Inc., Detroit.

ONLY Ford Trucks offer you *ALL* these long-life features: your choice of two great engines, the 100-H.P. V-8 or 90-H.P. Six—Flightlight aluminum alloy 4-ring oil-saving pistons—weatherproofed, Hi-Volt ignition—full pressure lubrication—axle shafts free of weight-load, even in light duty units—heavy channel section frames, *doubled* between springs in heavy duty models—big brakes, with non-warping, score-resistant cast drum faces—all told, *more than fifty* such examples of Ford endurance-engineering.

No wonder that Ford Trucks Last Longer! No wonder that 7 out of 11 of all Ford Trucks built since 1928 are still at work! No wonder the average age of all Ford Trucks on the job is nearly 9 years! And no wonder your Ford Dealer is calling for ever-increasing truck production schedules in Ford factories! See him now and get *YOUR* order in!

FORD TRUCKS

MORE FORD TRUCKS IN USE TODAY THAN ANY OTHER MAKE

ANY CONCRETE ROAD – ANYWHERE . . .

is better with TRUSCON *Welded Steel Fabric*

On every type of terrain—from mountain top to swampland—Truscon Welded Steel Fabric provides longer life and lower ultimate cost for concrete highways because it assures:

Resistance to cracking during setting period.
Tensile strength against subgrade friction.
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Resistance to slab separation.
Decrease of spalling and disintegration.

Truscon Welded Steel Fabric and associated Truscon Steel roadbuilding products give adequate protection to public funds invested in highways, and will build greater prestige for you. An experienced Truscon highway engineer will help on any concrete roadbuilding problem you may have.

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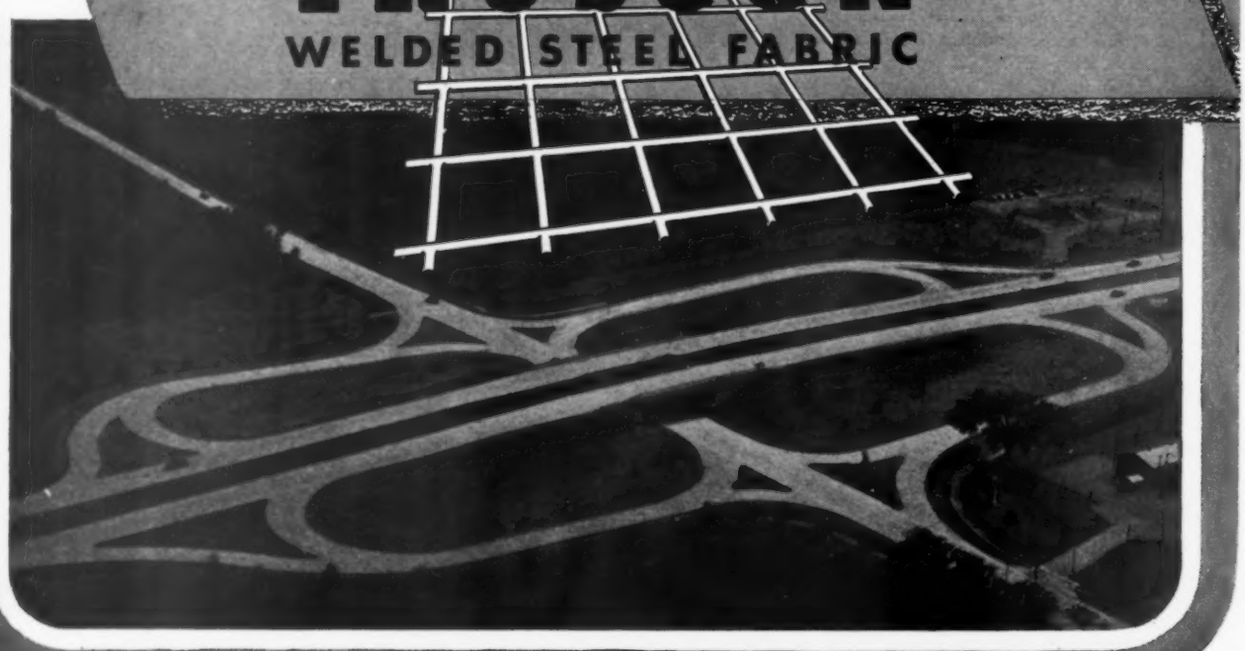
TRUSCON
WELDED STEEL FABRIC



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BACK OF EVERY JAEGER "AIR PLUS" IS THE MOST COMPLETE SERVICE

IN THE CONSTRUCTION FIELD — TOOLS • ENGINES • COMPRESSORS

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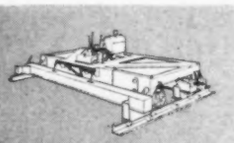

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"SPEEDLINE"
Concrete Mixers

"SURE PRIME"
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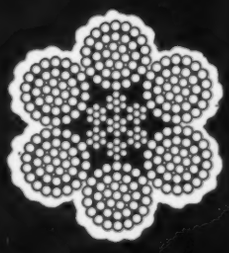
"DUAL-MIX" TRUCK MIXERS, AGITATORS — HOISTING ENGINES, SELF-RAISING TOWERS — CONCRETE AND BITUMINOUS PAVING EQUIPMENT

For Strength plus Flexibility



UPSON-WALTON
6x37 LAYRITE WIRE ROPE

FOR overhead traveling cranes in steel mills, for winch lines and slings, for holding and closing lines on grab buckets, for towing hawsers and mining machine ropes—industry after industry has conditions where high strength must be combined with great flexibility.

Wherever drum or sheave diameters are small, or where reverse or acute bends are encountered, fatigue stresses are high. For this type of service Upson-Walton 6 x 37 Perfection Layrite Cable is best because the individual wires in the strand are finer; therefore they are more flexible and better able to resist fatigue stresses. In addition, the greater number of fine wires in the rope gives it a greater metallic area, so strength is still high.

Hemp center or, where crushing conditions are extremely severe, IWRC (independent wire rope center).

Specify Upson-Walton 6 x 37 when you need maximum flexibility plus a high degree of strength.

Specify Perfection grade because this improved plow steel is the strongest and toughest and most resistant to wear of all the grades of wire used to make rope.

Specify Layrite because this fine *pre*formed wire rope results in longer life, greater safety and greater economy.

Upson-Walton 6 x 37 Perfection Layrite is worth specifying, and always up to specifications!

Established 1871

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THE UPSON-WALTON COMPANY

Manufacturers of Wire Rope, Wire Rope Fittings, Tackle Blocks

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IT'S NOT IN THE CARDS

for any Motor Grader without all-wheel drive and all-wheel steer

to equal the all-around performance of the "99-M"

AUSTIN-WESTERN COMPANY, AURORA, ILLINOIS, U.S.A.

BUILDERS OF ROAD MACHINERY

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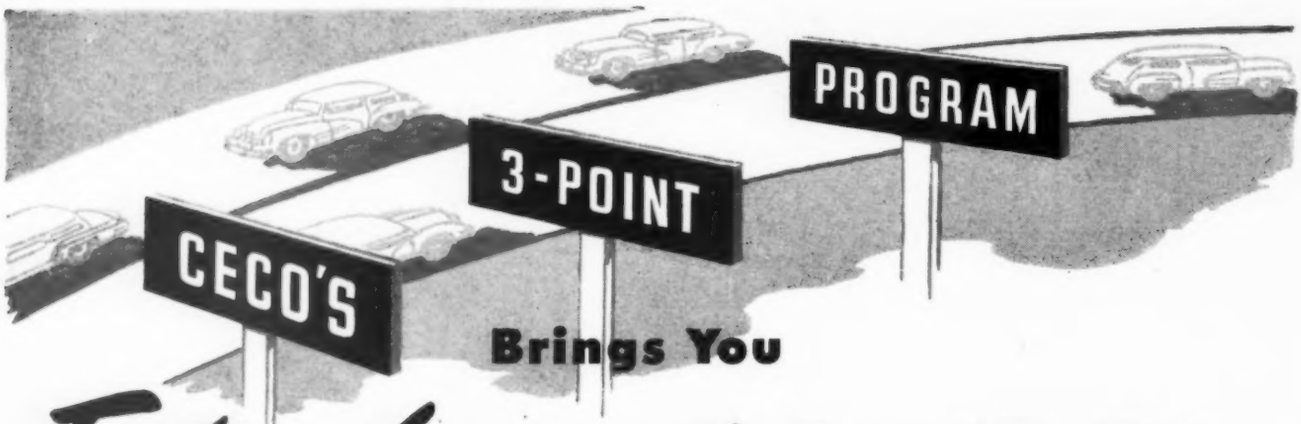
SINCE 1859



Brings You

Faster, Low-cost Road Building

HERE IS A 3-POINT PROGRAM *FOR SURER ROAD BUILDING PROFITS*

1 You can eliminate guesswork in bidding because Ceco supplies you with accurate data on the cost of materials for your jobs.

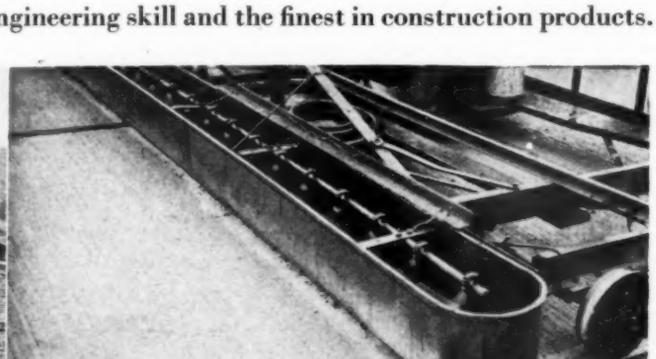
2 You can cut down detail work when you deal with Ceco. They supply all data on reinforcing and other highway materials.

3 You can depend on Ceco for a streamlined operation. In one complete order, Ceco gets materials to you as you require it.

CECO ENGINEERING + CONSTRUCTION EXPERIENCE HELPS YOU SOLVE ROAD BUILDING PROBLEMS

Ceco offers you more than precision road building materials. It offers you all the wealth of construction knowledge resulting from years of practical experience. Call any one of 23 offices strategically located coast to coast. Yes, call on Ceco for engineering skill and the finest in construction products.

Welded Fabric, electrically welded at intersections, makes ideal reinforcing.



Cecure Applicator gives positive, even application of Cecure compound.

Typical Ceco Highway Products

- Welded Wire Fabric
- Reinforcing Steel
- Dowel Bar Supports and Sockets
- Metal Center Strips
- Lead Transfer Devices
- Stake Pins
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- Cecure Curing Compound and Applicators
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UNDER CONTROL

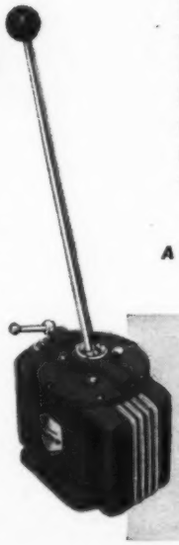
. . . of BLACKHAWK *Hydraulics!*

THE MEN who build plows and the men who use 'em — know the ease, speed and accuracy with which Blackhawk Hydraulic Controls lift and lower the blades. That's why nine out of ten snow plow manufacturers build with Blackhawk as standard equipment. When drifts are high and the going is tough, road men appreciate the dependable performance and extra security they get from Blackhawk Hydraulic Systems operated from the comfort of a warm cab. You'll be ordering known performance and satisfaction when you specify Blackhawk Hydraulics on *all* your road equipment. For complete information on the advantages of Blackhawk Hydraulics, write to your equipment manufacturer.

To Equipment Manufacturers:

Blackhawk Hydraulic Controls are engineered and priced for *quantity* purchase and *practical* installation on your products for even greater customer satisfaction. Submit your hydraulic problems to us. We will work with you in confidence.

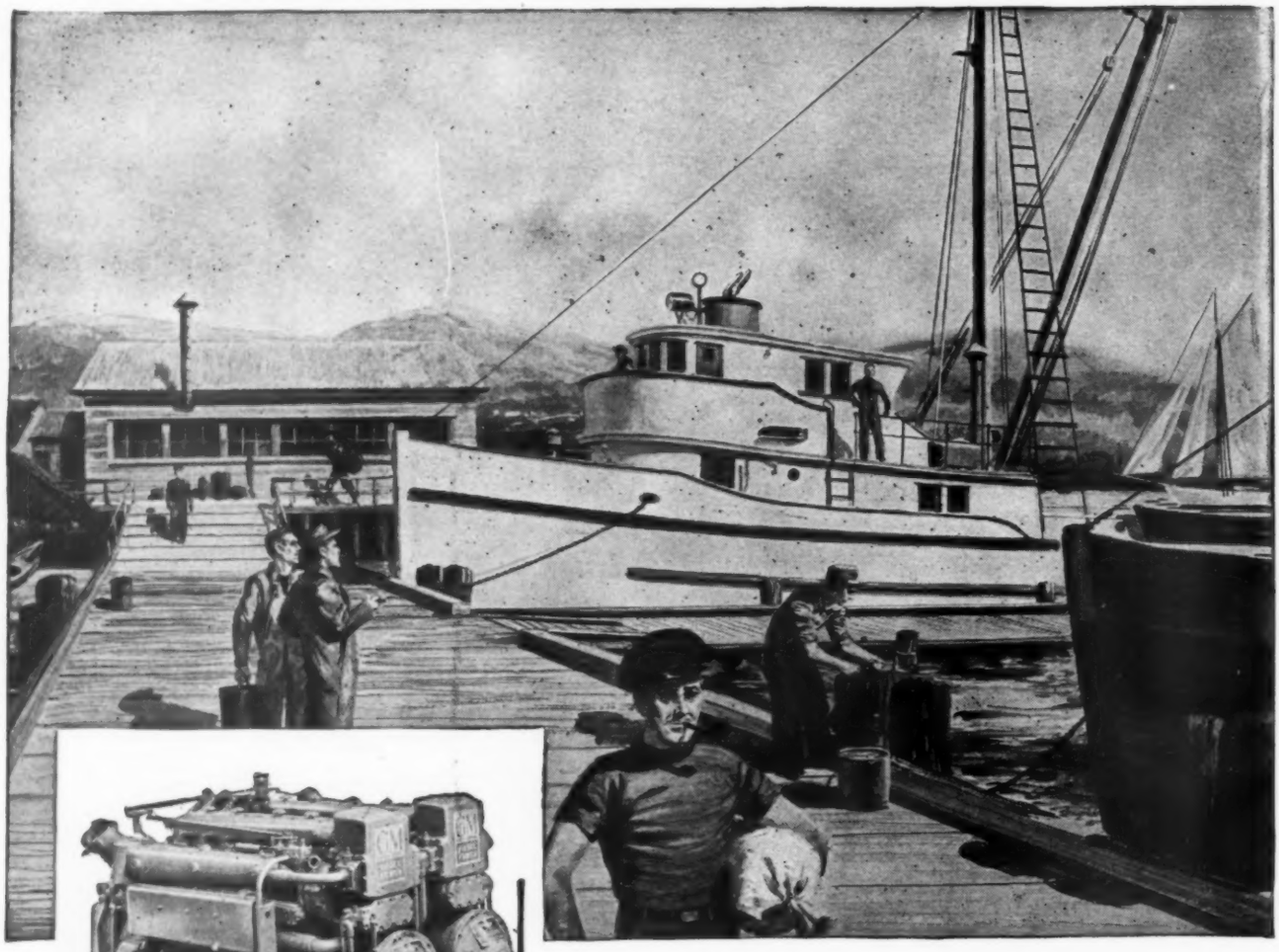
POWER-DRIVEN P-104 Power-Packer Pump —belt or gear driven —control valve is operated from cab. Compact, easily installed.

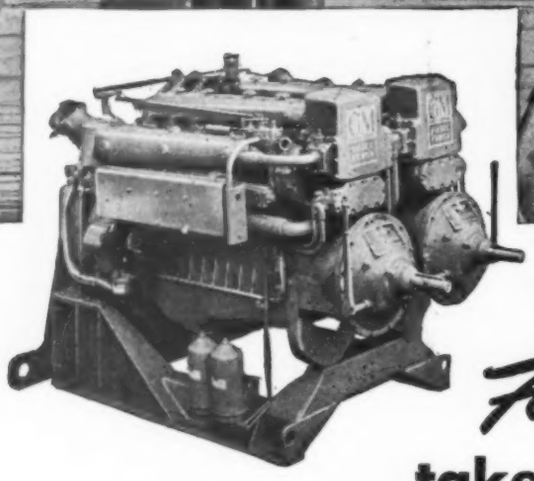


HAND OPERATED P-60 Power-Packer Pump —mounts in cab. Blackhawk is also the source for RAMS and VALVES for use with these pumps.

A Product of **BLACKHAWK MFG. CO., Dept. RS, Milwaukee 1, Wisconsin**

BLACKHAWK *Hydraulic* **EQUIPMENT**





CONTRACTORS *For Great Diesel Power*

take a tip from salty skippers

DAYS on end the engines of tuna clippers, gulf shrimpers and Grand Banks fishermen are on the go. Such engines have to be rough and dependable. And they're extra valuable when they provide brawny, economical Diesel power in small space. For that leaves more room for the catch.

So if you look in the hulls of some of the fastest, most successful boats in fishing fleets, you'll find General Motors Series 71 Diesel engines.

This is because GM Diesels have stamina, low-cost operation, and then something more. They pack their power in compact, easy-to-get-at units.

These and other GM Diesel qualities now make Diesel power available to many industries where size and weight heretofore prevented its use.

* * *

So whatever needs for power you may have in road-making machinery, crushers, shovels or any other construction equipment—look to GM Diesels.

Features of GM Diesels Important to Every User of Power

- ***QUICK TO START*** on their own fuel
- ***ECONOMICAL***—run on low cost fuel
- ***EASY TO MAINTAIN***—clean design plus accessibility
- ***LESS FIRE HAZARD***—no volatile explosive fuel
- ***COMPACT***—readily adaptable to any installation
- ***SMOOTH OPERATION***—rotating and reciprocating forces completely balanced
- ***QUICK ACCELERATION***—2-cycle principle produces power with every downward piston stroke

DETROIT DIESEL ENGINE DIVISION
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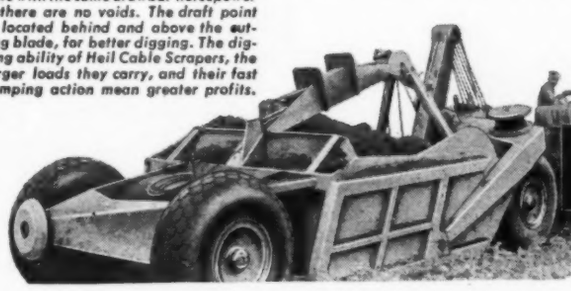
It's the *Curve* that does it

. . . earthmoving costs are lower when Heil Cabledozers are on the job

In addition to proper balance and strength, Heil Cabledozers have that something extra that puts them way ahead in dirt-moving ability. It is the Heil scientifically contoured blade. This specially curved blade, with its reversible cutting edge, was designed and developed by Heil engineers after studying and analyzing dirt-moving operations under the widest variety of conditions. Its advantages are better digging and rolling action — greater load-handling ability.

Ever-increasing demands from contractors all over the world prove that earthmoving costs are lower when Heil Cabledozers are on the job. Join the long list of satisfied Heil Cabledozers users today. See your International Industrial Power Distributor.

Heil Cable Scrapers have many unique, cost-cutting features. The bowl design is different. It permits the loading of 15% more material in the same length of time with the same drawbar horsepower —there are no voids. The draft point is located behind and above the cutting blade, for better digging. The digging ability of Heil Cable Scrapers, the larger loads they carry, and their fast dumping action mean greater profits.



R-84

THE HEIL CO.

GENERAL OFFICES • MILWAUKEE 1, WISCONSIN

$30,909,761 aint hay . . .

how much of it did you spend twice?

That 30 million dollar figure is the last available figure on the cost of snow removal and covers the clearance of 288,999 miles of road in the winter of 1944-1945.

Snow clearance money isn't wasted money—but how many miles of that 288,999 had to be plowed out again—how many miles did you have to plow out again—that kind of snow money is spent twice! It *is* wasted money.

Snogo will save that kind of waste! In the picture above a road plowed out and banked up by ordinary methods is being cleared out by Snogo. When Snogo gets through the job is all done until the next snowfall. No banks are built up to blow back and require costly repeat plowing. Snogo cuts away the deep side of the drift as easily as the low side and eliminates dangerous one-way bottlenecks to the center line.

Snogo means safer, winter highways. It means savings in snow clearance and it reduces winter road damage. Plan ahead to *remove* your snow not just to move it.

Clear Winter Roads MORE BUSINESS AND MORE JOBS!

SNOGO A SNOGO For EVERY BUDGET

KLAUER MANUFACTURING COMPANY
DUBUQUE, IOWA

High in Work Capacity *Low* in Operating Cost

High work capacity, combined with low operating costs have made Chrysler Industrial Engines the first choice of many manufacturers in the field of powered industrial equipment.

Their high compression, flexible horsepower and low weight characteristics permit installation in a minimum of space. Superfinishing of moving parts brings economical operation plus maximum time *on the job*.

Chrysler Industrial Engines in your equipment, plus nation-wide parts availability, mean more satisfied customers and repeat business. Send the coupon today for the Industrial Engine catalog.

Some Applications of Chrysler Industrial Power

Arc Welders	Industrial Lift Trucks
Air Compressors	Industrial Pumps
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Cranes	Motor Coaches
Crane Carriers	Portable Sawmills
Crane Loaders	Portable Well Drillers
Farm Tractors	Road Rollers
Fire Pumps	Self-propelled Farm Combines
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Gang Mowers	Street Flushers
Generator Sets	Winches

This versatile machine can be easily converted to trenchoe, back-filler, dragline or clam-shell. It's powered by a Chrysler Industrial 12 engine.

Note compactness and simplicity of the Chrysler Industrial 12 engine. A top flight performer in the tough digging or lifting jobs.

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12

HOW MUCH DOES A BLIZZARD COST?

THE REAL COST of a blizzard to your community is *not* the outlay for snow clearance. It's the incalculable losses to taxpayers due to traffic tieups—work stoppages—disrupted supplies — food shortages — health hazards—and general hardships and inconveniences. The longer the paralysis, the higher the cost.

Against this toll, the investment for the most modern, powerful, specialized snow removal equipment is low indeed. Ask any community protected by Walter Snow Fighters! They'll tell you that Walter Snow Fighters bring blizzards under control faster than any other equipment —remove a greater volume of snow—handle any drift conditions—do a cleaner, more thorough job.

As a result, you save all around. Fewer Walter Snow Fighters are required to do a better, faster job. Your snow clearance expenditure per storm is lower. Your community disruption is held to a minimum.

For over 25 years, Walter Snow Fighters have proved the soundest winter safety and economic insurance a community can have. Have one of our distributors outline the many reasons why. Or, write us for descriptive literature.

WALTER MOTOR TRUCK CO. 1001-19 Irving Ave. Ridgewood 27, Queens, L. I., N. Y.

WALTER SNOW FIGHTERS

IT'S doubly GOOD BUSINESS TO FINANCE YOUR PURCHASES OF CONSTRUCTION EQUIPMENT

Because: C.I.T. will furnish the funds AT LOW COST. By making only a moderate initial investment you can purchase all types of construction equipment and spread payment of the balance over many months.

HERE'S WHY !

Because: C.I.T. funds enable you to conserve working capital for payrolls, taxes, supplies. You can combine several purchases in one obligation and let the equipment help pay for itself out of earning capacity.

CONTRACTORS: When you buy construction equipment, LET C.I.T. FINANCE THE TRANSACTION. It's DOUBLY good business to conserve your own working capital for operating purposes. Take advantage of every opportunity to effect savings in purchases of materials and supplies and be in a position to bid with confidence on additional work.

C.I.T. financing can be arranged promptly. Tell us what equipment you are buying, balance to be financed and how you prefer to pay for it. As quickly as you can obtain delivery, a C.I.T. check completes the purchase. Any of these offices will gladly handle all financing details for you.

Send for free booklet describing C. I. T. financing.

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LIMA LIFTS FACE of BOZEMAN HILL

Working at an altitude of 6000 feet in a scenic wonderland, S. Birch and Sons, Great Falls, Montana, contractor, is carving four (4) miles of straight-line highway through Bozeman Hill, halfway between Bozeman and Livingston, Montana. The job calls for the moving of 511,886 cubic yards of mountain top, most of which is solid rock. Working as many as three (3) shifts a day, the LIMA 2½ cubic yard heavy-duty shovel, shown in the illustration, averaged 2600 to 3400 yards of rock per shift. This kind of excavating calls for the highest quality equipment. For this reason LIMA got the call. S. Birch and Sons are long-time users of LIMA equipment having purchased their first shovel in 1936. The continuous use of LIMA equipment for 10 years represents a lot of satisfaction. If you have a tough digging job coming up, profit by the experience of successful contractors, make your next shovel, crane or dragline a LIMA.

LIMA

SHOVELS • CRANES • DRAGLINES

LIMA LOCOMOTIVE WORKS, INCORPORATED
Shovel and Crane Division . . . . . Lima, Ohio, U. S. A.
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LIMA

A TYPE AND SIZE FOR EVERY MATERIAL HANDLING JOB

Use *Flintseal** . . .

New, Hot-poured, Joint-sealing Compound

Provides a POSITIVE SEAL . . . for streets, highways and airfields.

You're bound to be enthusiastic about ***Flintseal*** when you realize that it provides the smoothest, tightest, and most durable joint ever poured.

It *definitely* keeps water out of all types of pavement joints.

For ***Flintseal*** is an improved rubber asphalt compound . . . especially developed by Flintkote Research Laboratories . . . complies with Federal Specification SS-F-336. It's a material that:

1 Seals joints effectively against infiltration of moisture through repeated cycles of expansion and contraction of the concrete slabs.

2 Adheres perfectly to concrete . . . without use of primers.

3 Maintains resiliency . . . does not become brittle and crack in coldest weather or flow in hottest weather.

4 Melts quickly in especially designed equipment to pouring consistency at 410° to 425° F. for safe and economical handling.

*Trade-mark

THE FLINTKOTE COMPANY
30 Rockefeller Plaza, New York 20, N. Y.
Please send me data sheet on *Flintseal* and full information about method of handling.

Name .....

Company .....

City ..... *State* .....

Flintkote-Products for Industry

THE FLINTKOTE COMPANY · **INDUSTRIAL PRODUCTS DIVISION**
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FLINTKOTE INDUSTRIAL PRODUCTS

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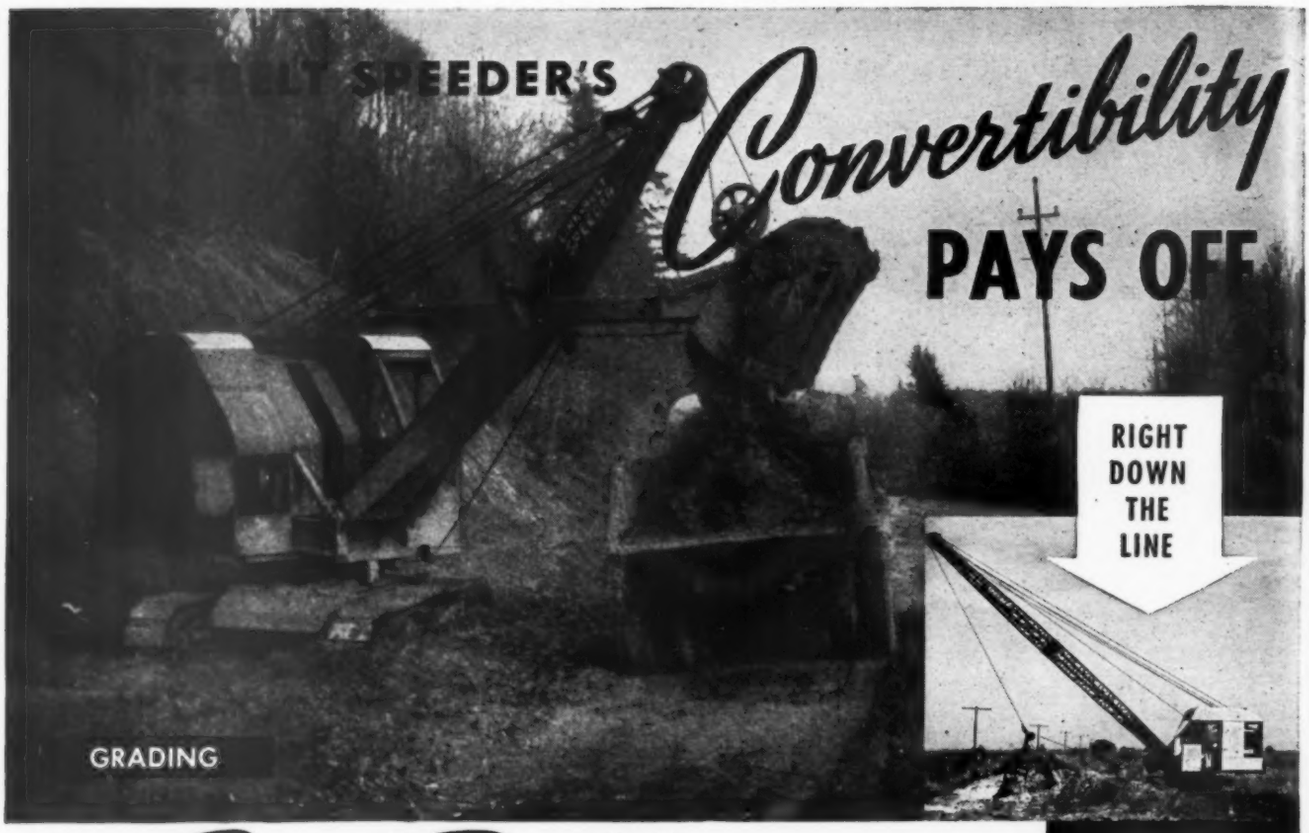
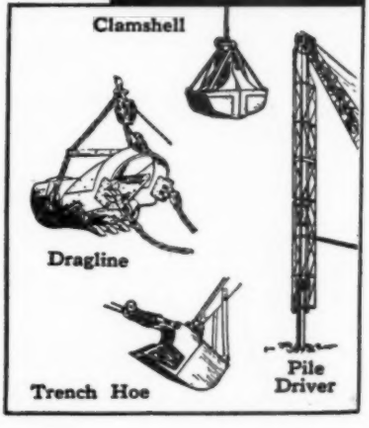


in Road Building

ONE MACHINE PERFORMS ALL OPERATIONS!

DITCHING

TRENCHING



You can do more work, more KINDS of work, more of the time, with a Link-Belt Speeder "shovel-crane" because it is quickly, easily convertible to any earth moving or handling operation.

Look at the variety of jobs illustrated here, all connected with road building — all done with the same standard Link-Belt Speeder, with interchangeable front end attachments.

No wonder contractors, highway departments, municipalities are considering a LINK-BELT SPEEDER in their future plans.

For Prompt, Efficient, Convenient Sales and Service:
There is a Link-Belt Speeder Distributor Located Near You

10,284

LINK-BELT SPEEDER

Builders of the Most Complete Line of
SHOVELS-CRANES-DRAGLINES

LINK-BELT SPEEDER CORPORATION, 301 W. PERSHING ROAD, CHICAGO 9, ILL.
A DIVISION OF LINK-BELT COMPANY

★ *Let's keep America* ★ **AHEAD** ★ **ON GOOD ROADS!**

WHERE THE GOING IS TOUGHEST

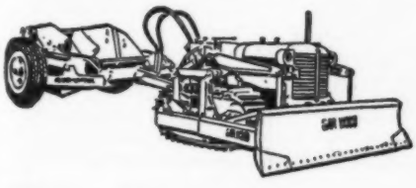
...SPECIFY GAR WOOD!

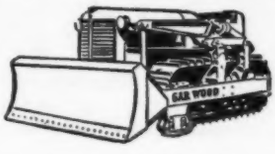
In use everywhere for clearing, leveling, grading, and excavating ...All Gar Wood Road Machinery is specifically designed, engineered, and built to make the *toughest* jobs *easy*...and more profitable.

That's a *fact*... for Gar Wood Bulldozers and Dozecasters are the result of practical, down-to-earth engineering. They're constantly being proven and reproven in the field...in mining, quarrying, lumbering, railroading, and general contracting.

Moving the four corners of the earth, rebuilding a war-torn world, Gar Wood Road Machinery has *got* to be good. For your next job... *particularly if it's a tough one*... specify Gar Wood.

GAR WOOD GW TRADE MARK INDUSTRIES





SERVING THE CONSTRUCTION INDUSTRY SINCE 1872

75 YEARS *in the Making!*

The OSGOOD Type 100 is available as shovel, clamshell, dragline, crane and stripper. Write for your copy of the new Type 100 Bulletin.

THIS IS THE NEW OSGOOD TYPE 100

. . . modern from crawlers to point sheaves . . . a powerful new machine incorporating design and construction advancements never before available. Yet the OSGOOD Type 100 has been "on the boards" for 75 years!

For three quarters of a century, OSGOOD has designed and built equipment for the construction industry, pioneering improvements that have long since become standard. Today, the experience and know-how gained through 75 years of manufacturing dependable, economical-to-operate machines is reflected in this newest OSGOOD unit. Here is ample power for the toughest job, ease of operation that means more work per day, economy of operation that means more profit per job. Watch for the OSGOOD Type 100 . . . plan now to enjoy the advantages that only an OSGOOD can provide.

THE GENERAL EXCAVATOR COMPANY
CRANES, DRAGLINES AND SHOVELS
DIESEL, GAS, ELECTRIC

Associated with The General Excavator Company

OSGOOD

THE OSGOOD COMPANY • MARION, OHIO

OSGOOD
SHOVELS, DRAGLINES CRANES
CRAWLER & WHEEL MOUNTS
DIESEL, OIL, GAS, ELECTRIC

"After all mister

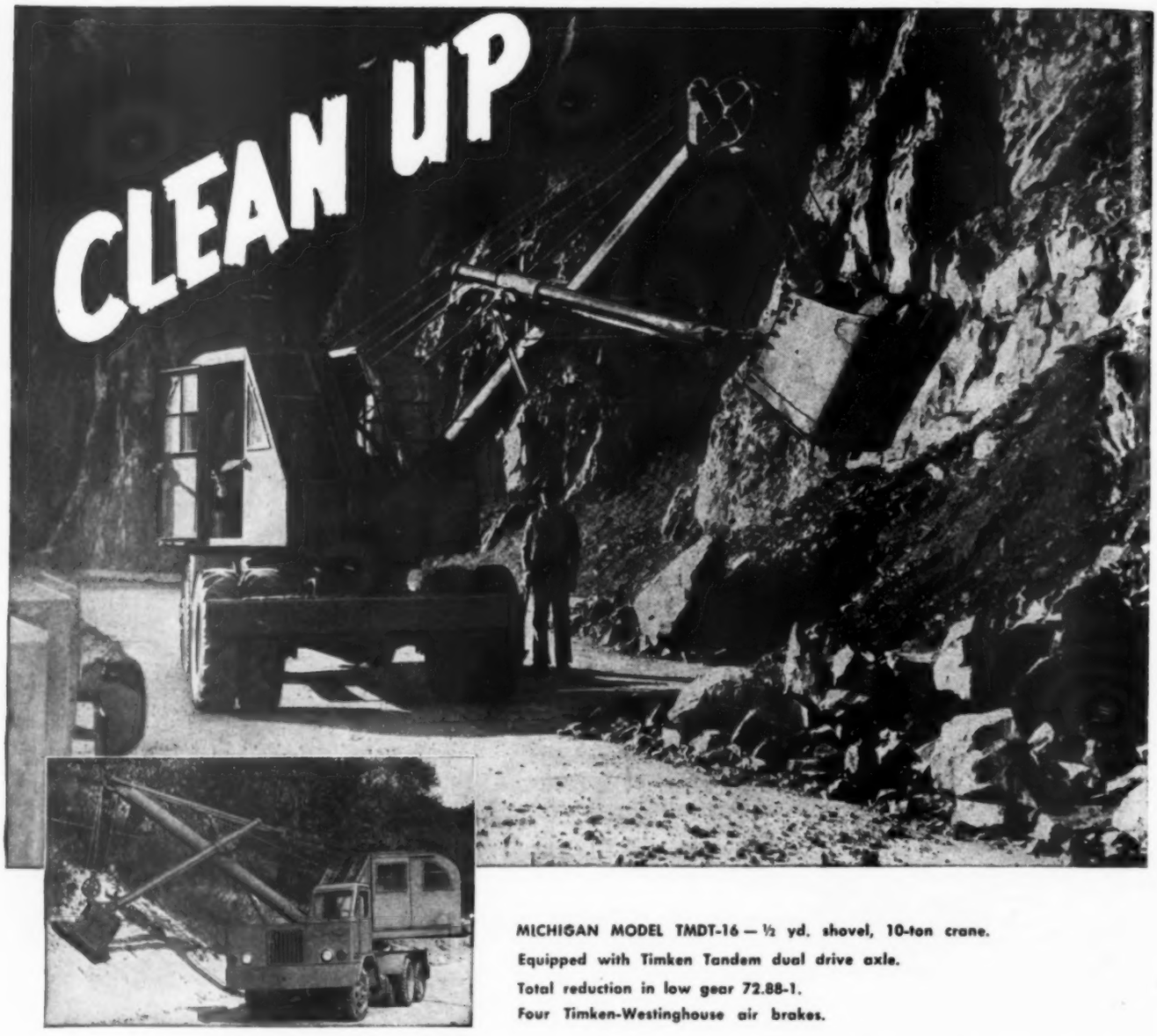
. . . . . you didn't have to take the hard way to discover whether HUBER ROAD ROLLERS are husky machines built to take a lot of punishment. Every HUBER ROLLER owner would confirm this as well as enthusiastically tell you about Huber's quick and easy hydraulic steering — ample speed and power—short wheel base for real maneuverability—simplified design—minimum maintenance —unusual economy."

THE HUBER MFG. COMPANY • MARION, OHIO, U. S. A.

HUBER

3 Wheel • Tandem

ROAD ROLLERS *and* MAINTAINERS



MICHIGAN MODEL TMDT-16 — ½ yd. shovel, 10-ton crane.
Equipped with Timken Tandem dual drive axle.
Total reduction in low gear 72.88-1.
Four Timken-Westinghouse air brakes.

with MICHIGAN

You'll be 'way ahead when schedules are tough and competition is tougher. You can cut cost-per-job, clean up even the tough ones faster with MICHIGAN Mobile SHOVEL-CRANE. Its truck mobility saves valuable time when traveling from job to job and permits easier, quicker movement on the job. Smooth-as-silk finger tip air controls plus dependable, economical power give you that fast, steady performance that counts . . .

Plan now to put MICHIGANS on your jobs! There's a complete line of ⅜ yard and ½ yard shovels, 6 to 12 ton cranes — all fully convertible, all one-man operated. Get the facts — ask for Bulletin **RS-126.**

MICHIGAN
POWER SHOVEL COMPANY
BENTON HARBOR, MICHIGAN

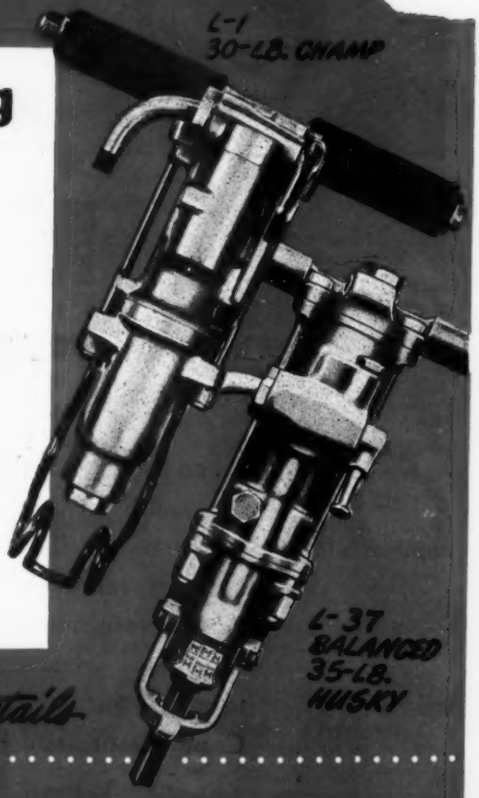
Less Power to
DRILL MORE FOOTAGE
with
SULLIVAN
SILVER STREAK
CADMIUM PLATED
ROCK DRILLS

L-47
45-LB. CLASS DRILL
WITH 55-LB.
PERFORMANCE

L-57
DRILLS TO
15-FEET
UNDER
AVERAGE
CONDITIONS

Cadmium Plating
means
LONGER LIFE
BETTER
LUBRICATION
NO RUSTING
PREVENTION
OF RUCKING

L-1
30-LB. CHAMP



L-37
BALANCED
35-LB.
HUSKY

Write for Bulletins Giving Full Details

Consult a Joy Engineer

SULLIVAN DIVISION
JOY MANUFACTURING COMPANY
GENERAL OFFICES: HENRY W. OLIVER BUILDING
PITTSBURGH, PENNSYLVANIA

ANYWHERE

WITH SCHRAMM AIR COMPRESSORS!

Construction work indoors, outdoors, on land, on water . . . anywhere . . . Schramm Air Compressors are sturdy enough, compact and lightweight enough, to give you all the compressed air you want!

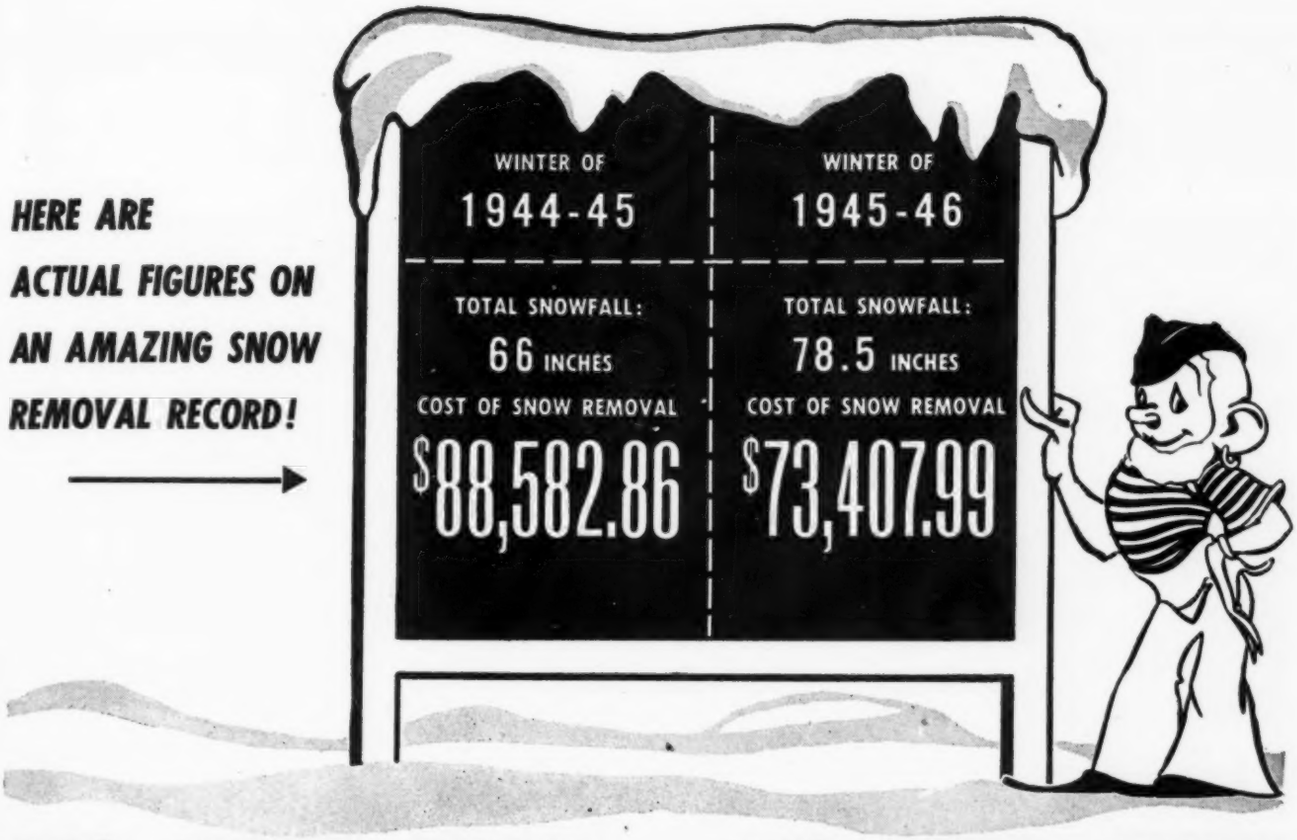
The construction field likes these Schramm features: 100% watercooled, permitting running with hood "on"; forced feed lubrication; mechanical intake valve; easy to move about on the job!

Schramm Compressors come in a complete range of sizes, to meet your needs. Write today for complete information on Schramm Compressors and Pneumatic Tools.

SCHRAMM INC.

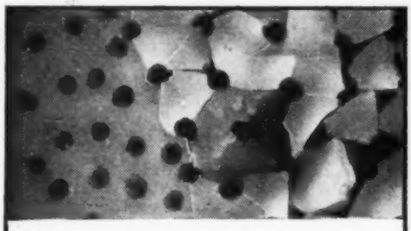
THE COMPRESSOR PEOPLE
WEST CHESTER
PENNSYLVANIA

HERE ARE ACTUAL FIGURES ON AN AMAZING SNOW REMOVAL RECORD!



20% MORE SNOW . . . 30% LESS COST!

. . . thanks to STERLING "Auger-Action" Rock Salt!



Sterling "Auger-Action" at work

- ★ Assures quick removal
- ★ Saves labor and equipment
- ★ Makes driving safe

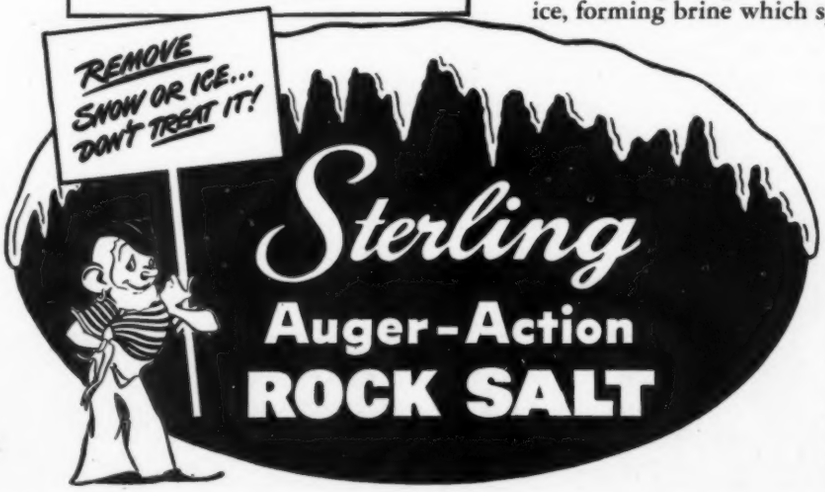
Statistics tell the story. Last winter, with 20% more snow than the previous winter, a large eastern city reduced the cost of removing each foot of snow that fell by 30%! It did it with *Sterling* "Auger-Action" Rock Salt!

Thanks to streets quickly made *clear and dry*, skidding accidents were fewer. Merchants, motorists, commercial drivers, and pedestrians praised results . . . acclaimed their "snow-free city"!

YOU, TOO, CAN SAVE!

Your own city, county, state, can easily match this snow removal feat. Simply spread Sterling Rock Salt at the start of each storm. It keeps snow and ice from packing or bonding with pavements . . . keeps them soft and mealy for easy plowing . . . makes even heavy falls easy to remove.

Sterling's auger-action also bores through compacted snow and ice, forming brine which spreads out, loosening the bond with pavement. Traffic shatters the mat, and the remaining brine prevents further icing. You're bound to save time, labor, money . . . receive wholehearted public endorsement.



Get your free copy at once of **"Why, When and How to Apply Sterling 'Auger-Action' Rock Salt."** Just fill out and mail this coupon.

INTERNATIONAL SALT COMPANY, INC.
Dept. RS-12, Scranton, Pa.

Kindly send me today a free copy of "Why, When and How to Apply Sterling 'Auger-Action' Rock Salt."

*Name*_____

*Title*_____

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*City*_____ *State*_____

Here are *1050* MEN shoveling snow

. . . That's the Manpower of a *Brōs* Rotary

Every minute the *Bros* Rotary does a snow removal job it equals 1050 men working with shovels. The NEW *Bros* Sno-Flyr puts more snow into the haul-away trucks because it delivers the snow with greater velocity and really packs it in. That's economical snow loading. It's the type of work that enables the *Bros* to pay for itself within a short time.

The forward and vertical action of the exclusive *Bros* feeding rake delivers the snow to dual discharge rotors which have a casting range of 150 feet on airport and highway work. The same power can be utilized with a capped chute for shorter casting distance or loading work. The casting capacity of the 170 h.p. unit is up to 42 tons per minute of fresh-fallen snow while the 275 h.p. unit rates up to 51 tons per minute.

Write for further details. Wm. *Bros* Boiler and Manufacturing Company, Minneapolis 14, Minn.

BRŌS

MANUFACTURERS OF THE FASTEST AND MOST POWERFUL ROTARY PLOWS

"BUT WHAT'S YOUR LAST NAME?"

Our last name is *Koppers*. Many of you know our "children" by their "first names," but do you know their last name?

That is important to us, and it's important to you, too.

Many of you vouch for the extra service you get from Fast's Self-aligning Couplings or American Hammered Piston Rings, or White Tar insecticides or D-H-S-Bronze . . . and don't know that their last name is Koppers. If you know, you are probably disposed to put more than ordinary trust in other products made by Koppers.

Did you know that you can get a Koppers product for coating metal surfaces to prevent corrosion? A Koppers material that makes roofs last longer? Lumber that defies decay and termites? And many other products made with the same skill and originality and inventiveness as those?

So . . . look for this trade-mark which will soon be found on all Koppers products. Here it is.

K
KOPPERS

It is the mark of an organization which is engaged in many phases of engineering, construction, chemistry and coal carbonization . . . is in the forefront of new synthetic developments . . . is an important supplier to the pharmaceutical industry and to many other industries. For top value, look for this mark. Koppers Company, Inc., Koppers Building, Pittsburgh 19, Pennsylvania.

THE INDUSTRY THAT SERVES ALL INDUSTRY

For example . . .
for the highway industry

Among the principal products Koppers provides for the highway and related construction industries are:

Tarmac road tars.

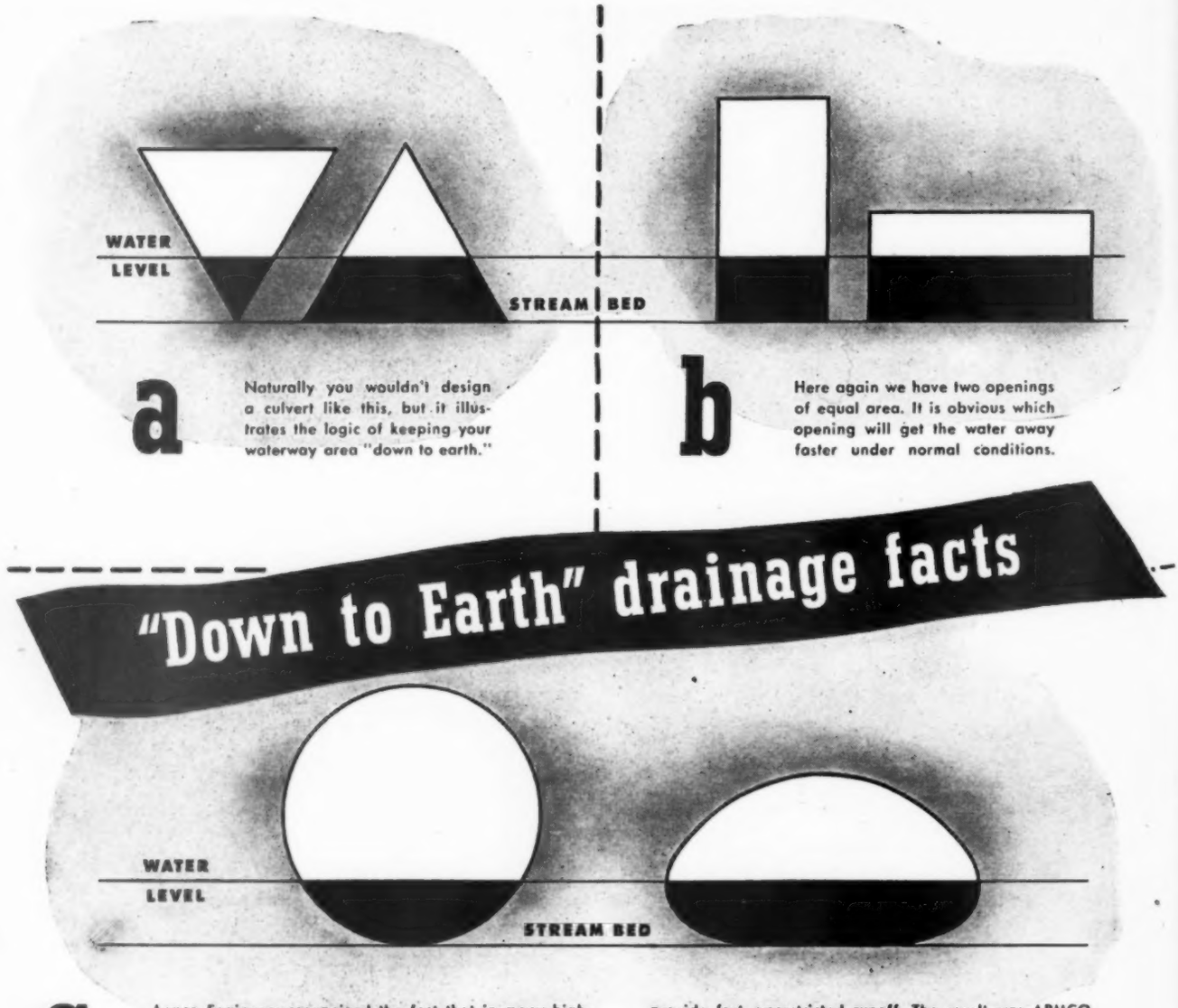
Waterproofing and dampproofing materials for concrete and masonry.

Pressure-treated bridge timbers, piles, poles, guard rails and guard rail posts, culverts, crossing planks, etc.

Piston Rings for automotive and diesel engines, compressors, pumps, etc.

Plastipitch Protected Metal roofing and siding.

Bituminous-base paints.

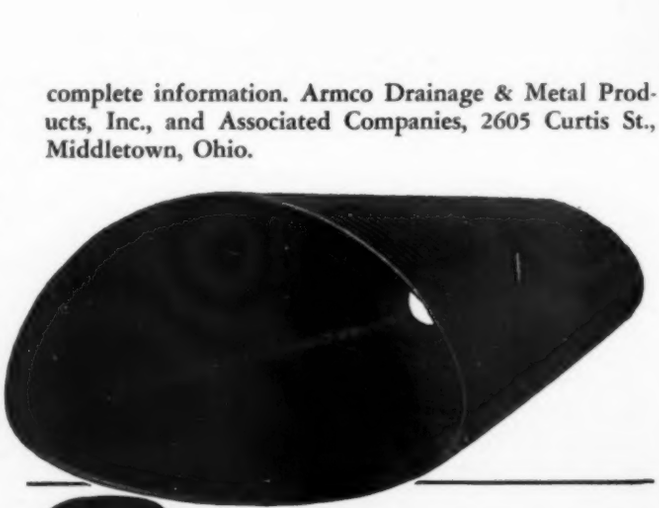

WATER
LEVEL
STREAM BED
a
Naturally you wouldn't design a culvert like this, but it illustrates the logic of keeping your waterway area "down to earth."
b
Here again we have two openings of equal area. It is obvious which opening will get the water away faster under normal conditions.
"Down to Earth" drainage facts
WATER
LEVEL
STREAM BED
C
Armco Engineers recognized the fact that in many highway applications conventional drainage structures were not entirely satisfactory. They set out to solve the two most important problems: (1) Limited headroom. (2) How to provide fast, unrestricted runoff. The result was ARMCO Pipe-Arch—a new kind of culvert having all the advantages of round corrugated metal pipe and with the greatest effective waterway area located in the bottom.

Thousands of installations and exhaustive tests are convincing evidence that ARMCO Pipe-Arches bring new economy and efficiency to highway drainage.

This corrugated pipe-arch is fabricated into a single unit and shipped as a complete structure ready for quick installation. When necessary, long lengths may be joined by sturdy band couplers. An unskilled crew can make an average installation in less than an hour, using only simple tools.

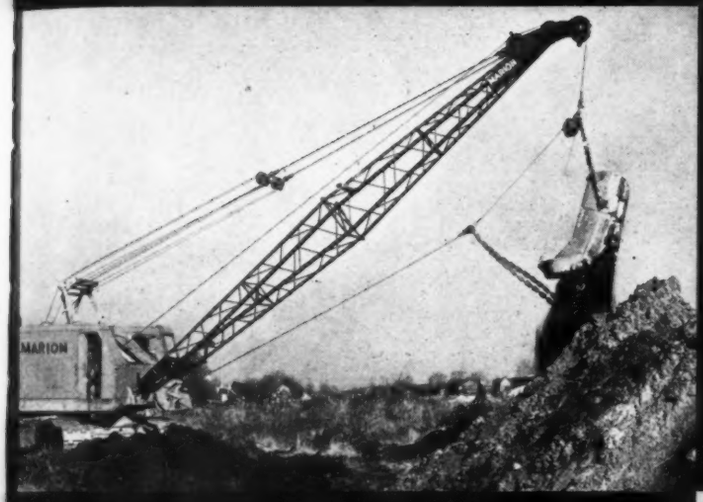
ARMCO Pipe-Arches are the safe, practical answer to problems of limited headroom. They have ample strength under shallow cover to withstand the impact and vibration of heavy traffic. Uneven foundations are no hazard. And because ARMCO Pipe-Arches "fit the ditch" there is less excavation. Drainage efficiency goes up and the wider bearing area insures added safety in soft ground.

ARMCO Pipe-Arches have all the proved advantages of full-round corrugated pipe plus a functional design that meets specific highway drainage requirements. Write for complete information. Armco Drainage & Metal Products, Inc., and Associated Companies, 2605 Curtis St., Middletown, Ohio.



ARMCO Pipe-Arches

FOR HANDLING FULL-RATED LOADS UNDER ALL DIGGING CONDITIONS



FOR MAXIMUM STABILITY ON EVERY JOB

YOU NEED A MARION

A MARION stands on its record of proven performance in any kind of digging. This ability to do a better job, in less time, and at lower cost is yours when you have a MARION on the job.

WHAT IS YOUR MATERIAL HANDLING PROBLEM?

from 3/4 cu. yd. MARION POWER SHOVEL COMPANY MARION SINCE 1884 to 40 cu. yds.

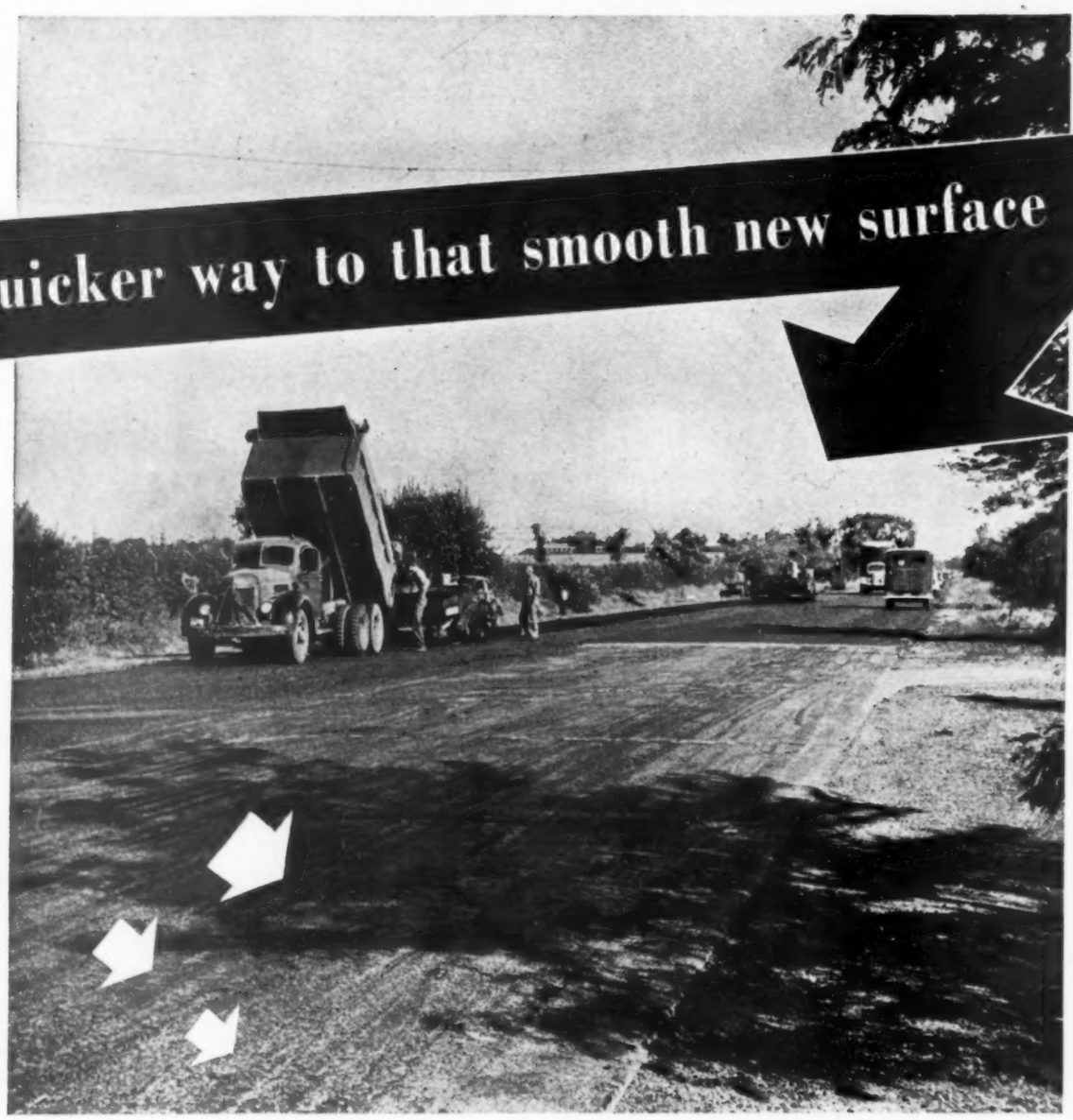
MARION

POWER SHOVEL COMPANY

MARION, OHIO, U. S. A.

Offices and Warehouses in all Principal Cities

A quicker way to that smooth new surface



FACED with the pressing problem of resurfacing worn-out roads, many highway departments today are turning to asphalt for a road-top that's smooth and glare-free... a road that's easily patched, resistant to erosion, unharmed by wintertime de-icing chemicals.

They want this fine new surface quickly, too, and inexpensively. And here again they turn to asphalt —for asphalt saves time and money in these important ways:

1. Asphalt can be laid right over old roads of brick, asphalt or concrete.

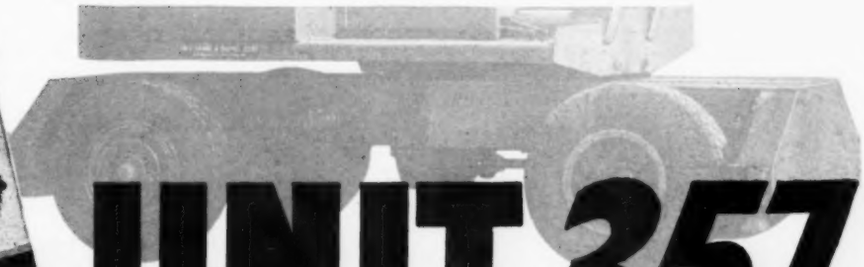
2. Asphalt can be laid quickly, without forcing traffic to detour. One traffic lane is resurfaced at a time—it's ready for use in a few hours, and meanwhile traffic continues over the other lanes.

3. Asphalt can be used to widen narrow roads at the same time they are resurfaced.

4. Asphalt can be laid with a minimum of manpower and a minimum investment in road-building equipment. In fact many experienced contractors already have all the equipment necessary.

A Standard Oil Asphalt Representative will be glad to give you details of the methods and procedure followed by other highway departments now using asphalt-resurfacing to keep up their highway systems. Call the local Standard Oil Company (Ind.) office, or write 910 S. Michigan Ave., Chicago 80, Ill.

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

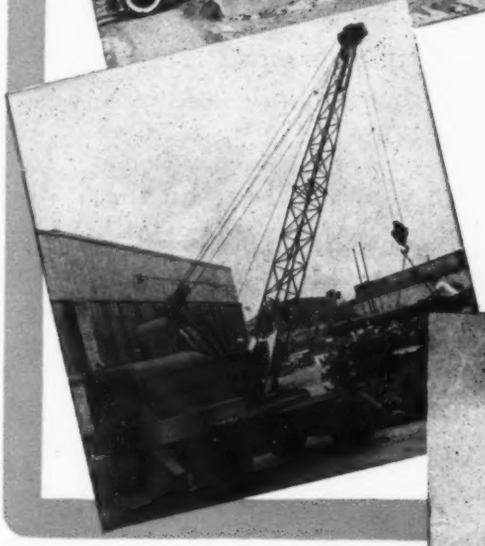


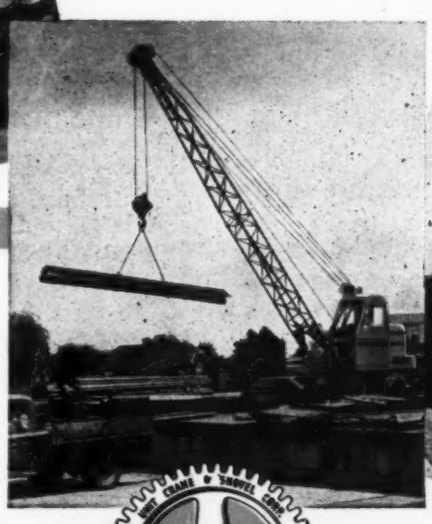
UNIT 357
MOBILE CRANE

- *It's Self Propelled*
- *It Rides on Rubber*
- *It Has 1001 Uses!*

Fast, versatile industrial crane with plenty of LIFT ability . . . ideal for moving castings, steel, scrap, coal, lumber or even machine tools. Travels anywhere . . . on paved surfaces, cinders or just plain mud . . . gets there in a hurry. Available with crane hook, clamshell, or magnet . . . quickly convertible to any other attachment. Operated by ONE man . . . powered by ONE engine . . . controlled from ONE position in cab. Features include: Hydraulic steering . . . Air-actuated hydraulic brakes . . . One piece cast gear case. FULL VISION CAB, pioneered by UNIT, provides 360° visibility for greater safety and efficiency.

5 Ton Capacity . . . 7 Tons with Outriggers





CONTACT FACTORY DIRECT FOR PRICE AND DELIVERY

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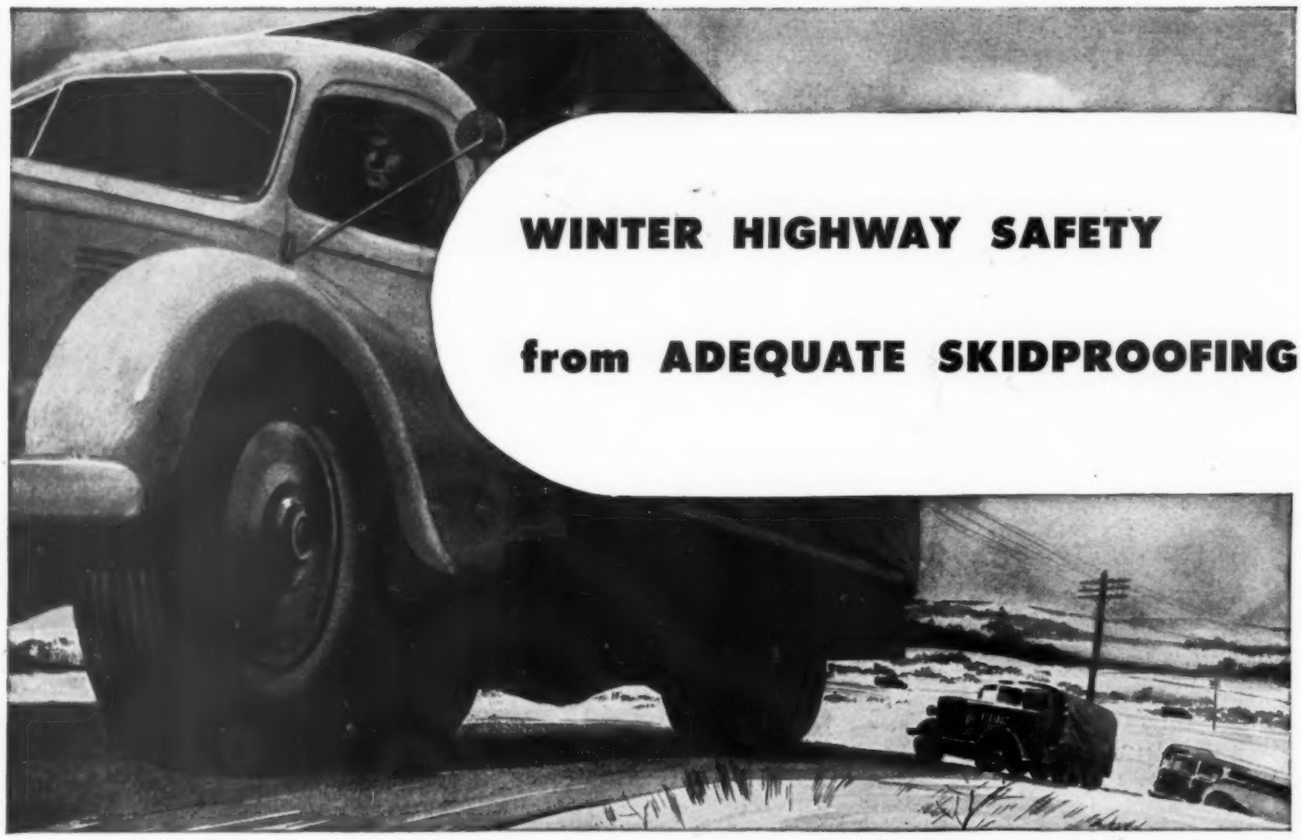


WINTER HIGHWAY SAFETY

from ADEQUATE SKIDPROOFING

The surest and quickest protection against the dangers of icy roads is adequate skidproofing. Backed by time-tested practical experience, skidproofing has proven itself to be the greatest life saver and property saver of them all.

And the best skidproofing—the fastest and most effective skidproofing is provided by abrasives treated with calcium chloride because . . .

You can get them out on the road faster—your abrasives remain unfrozen in the stockpile and are easy to load on the truck.

And when your abrasives hit the road they stick quick—stick tight because calcium chloride supplies the moisture that makes them act fast.

Economical, too, because abrasives treated with calcium chloride go farther and stick longer.

Get our literature on method.

Calcium Chloride Association • LaSalle Bldg., 1028 Connecticut Ave., Washington 6, D. C.

ICE CONTROL WITH

CALCIUM CHLORIDE

FAST • POSITIVE • ECONOMICAL

Gears Icy Roads to Tires

BETTER ROADS

are coming—at lower cost

Yes, for the vast job ahead in the building of good all-weather roads, alert highway authorities will take advantage of the new high production, low cost methods.

Soil stabilization today has been developing rapidly into an exact science. With greater use of native in-place materials, it is now possible to definitely pre-determine load carrying strength—to properly engineer these roads.

And speedy construction has also reached a new high with the development of the new P&H SINGLE PASS STABILIZER. Here, one machine fulfills the 8 basic requirements of processing native soils at a single pass—with any type of admixture:

1. Control processing depth for accurate proportioning
2. Pulverize the soil thoroughly
3. Blend materials uniformly
4. Create a true sub-grade
5. Disperse the liquid through the entire volume in measured quantity
6. Mix the coated material uniformly
7. Lay the completely processed material in a fluffy, even depth, ready for compaction
8. Do all these things in one pass — at a good rate of speed.

Contractors and Highway Departments contemplating the construction of base courses, light traffic roads, streets, airport runways, etc., should obtain complete information.

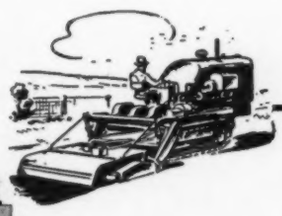
P&H

SINGLE PASS STABILIZERS

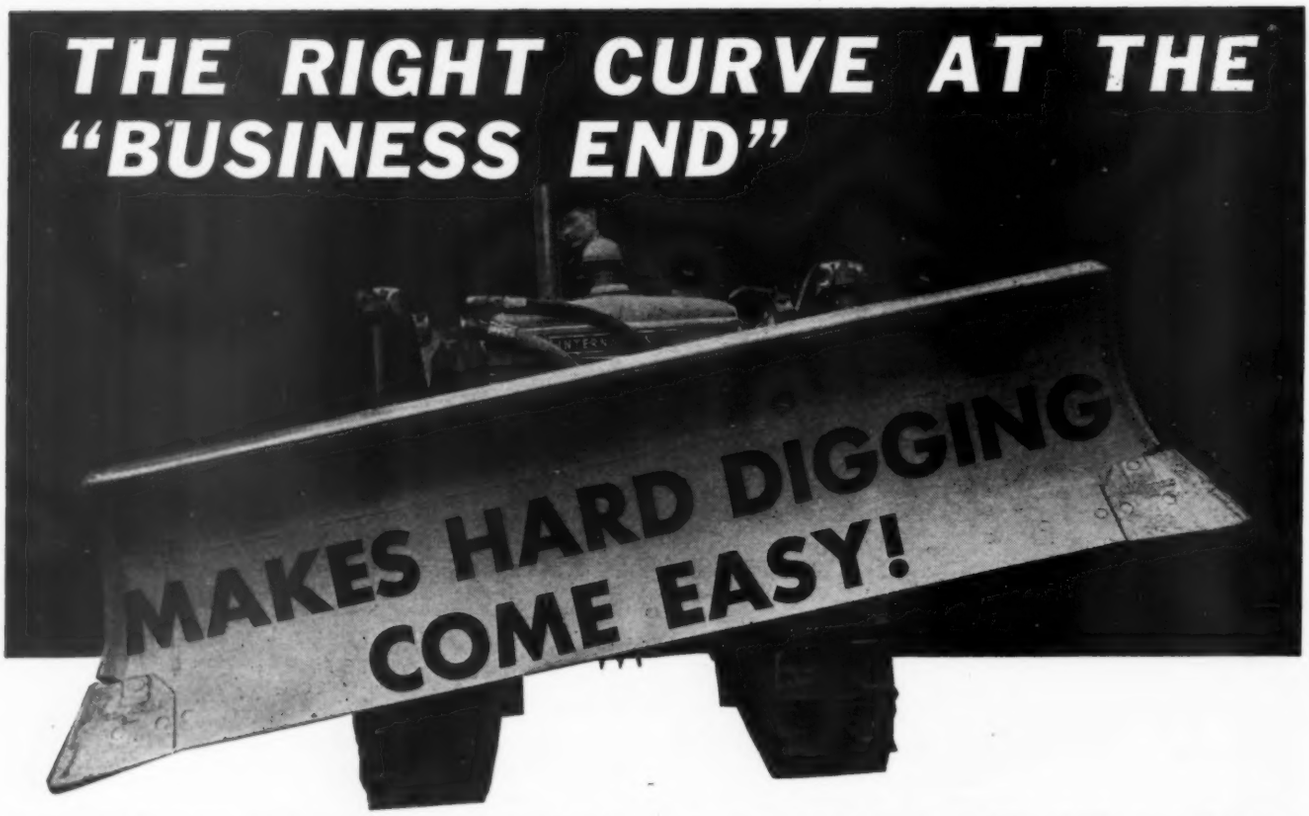
4496 W. National Avenue
Milwaukee 14, Wisconsin

HARNISCHFEGER CORPORATION

EXCAVATORS • ELECTRIC CRANES • ARC WELDERS P&H HOISTS • WELDING ELECTRODES • MOTORS

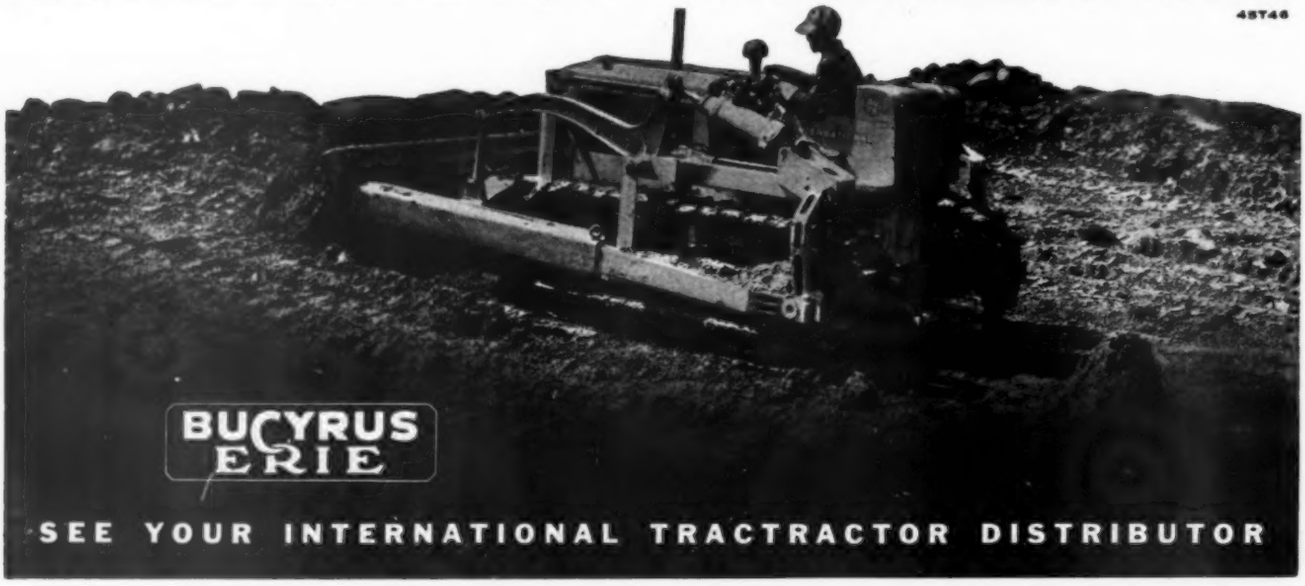


THE RIGHT CURVE AT THE "BUSINESS END"

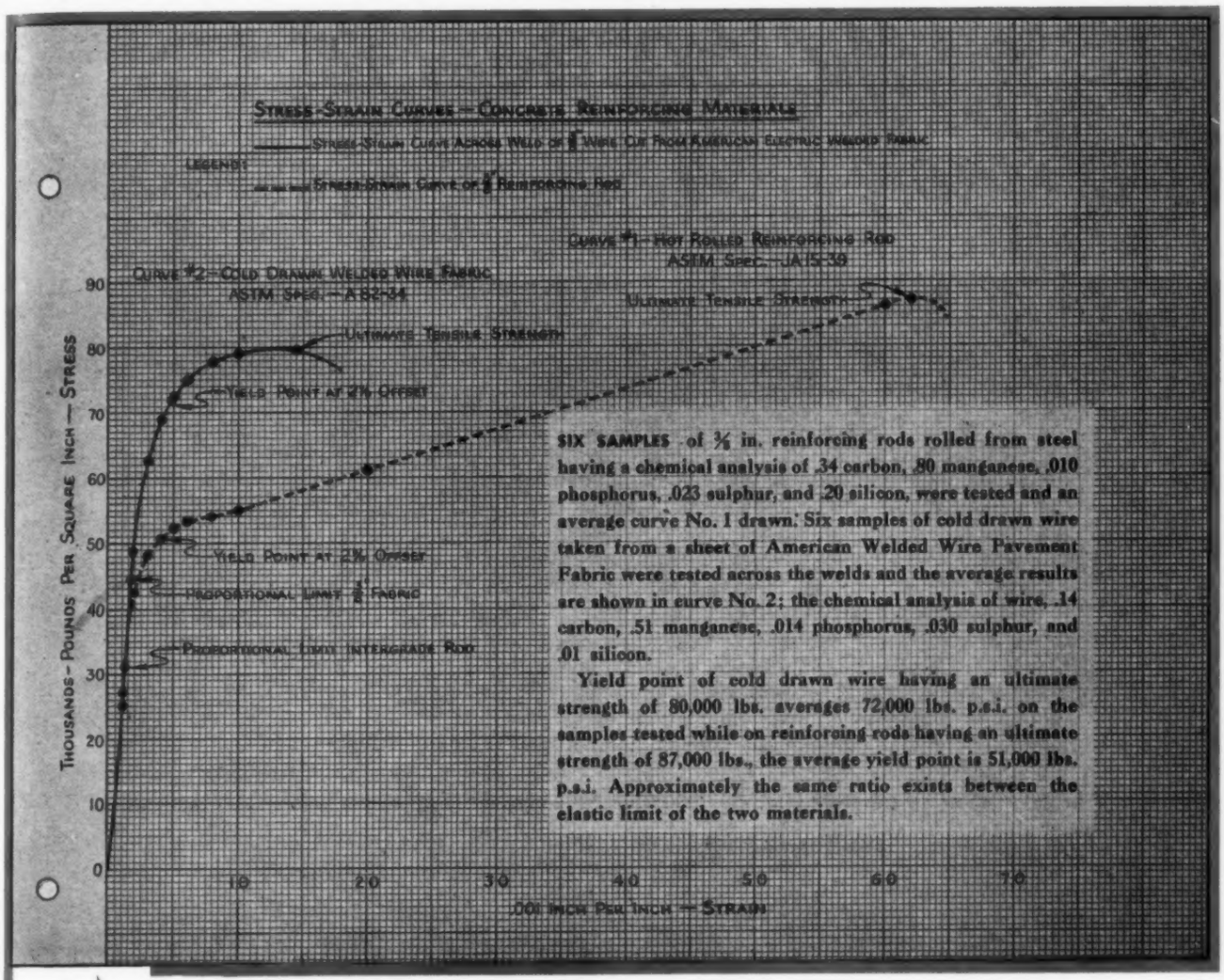


You can dig more easily and carry bigger loads with Bucyrus-Erie Bullgraders and Bulldozers because efficient blade curvature keeps the dirt rolling freely. Developed during years of experiment by the most experienced engineers in the dirt-moving industry, these blades combine the advantages of easy penetration, efficient suction, and rolling action that contributes to fast, easy cutting and discharge of dirt. They make work easier because they really work! Bucyrus-Erie blades stand up to long, hard digging, too, because they have the strong construction that has proved its ability to withstand plenty of hard knocks. And backing up efficiency of blade action are the many other features that have made Bucyrus-Erie Bullgraders and Bulldozers outstanding: easy adjustments, easy operation, maintenance of original tractor balance, full visibility, versatility of use. Ask your International TracTracTor Distributor about them!

BUCYRUS-ERIE COMPANY
SOUTH MILWAUKEE, WISCONSIN
45T46



SEE YOUR INTERNATIONAL TRACTRACTOR DISTRIBUTOR



SIX SAMPLES of ⅜ in. reinforcing rods rolled from steel having a chemical analysis of .34 carbon, .80 manganese, .010 phosphorus, .023 sulphur, and .20 silicon, were tested and an average curve No. 1 drawn. Six samples of cold drawn wire taken from a sheet of American Welded Wire Pavement Fabric were tested across the welds and the average results are shown in curve No. 2; the chemical analysis of wire, .14 carbon, .51 manganese, .014 phosphorus, .030 sulphur, and .01 silicon.

Yield point of cold drawn wire having an ultimate strength of 80,000 lbs. averages 72,000 lbs. p.s.i. on the samples tested while on reinforcing rods having an ultimate strength of 87,000 lbs., the average yield point is 51,000 lbs. p.s.i. Approximately the same ratio exists between the elastic limit of the two materials.

FOR CRACK CONTROL—

Distributed Reinforcement

AMERICAN STEEL & WIRE COMPANY
USS
AMERICAN WELDED WIRE FABRIC
UNITED STATES STEEL

Welded Wire Fabric Reinforcement controls cracking in a concrete pavement slab more economically and efficiently than other types. Performance records of pavements already built show that pavement slabs reinforced with distributed reinforcement are in better condition than other pavements of the same age.

And the composite curves shown here indicate that for stresses in the steel from 45,000 to 70,000 pounds p.s.i. cracks that may form in concrete pavement slabs will be held more tightly together with cold drawn American Welded Wire Fabric than with steel fabric manufactured from hot rolled rods.

When you are planning new concrete highway construction, make sure that you have full information on U·S·S American Welded Wire Fabric, the distributed reinforcement that has proved *economical* wherever its use is practical.

American Steel & Wire Company
Cleveland, Chicago and New York
Columbia Steel Company, San Francisco
Pacific Coast Distributors
Tennessee Coal, Iron & Railroad Company, Birmingham
Southern Distributors
United States Steel Export Company, New York

UNITED STATES STEEL

"My Vote Goes to The Truck I Drove In The Army"

Returning veterans, working on jobs where motor trucks are purchased or used, just naturally go for GMC. For wherever they served ... Africa or the Aleutians, Europe or the Pacific ... their number one source of truck transport was the GMC "six-by-six." And whatever their branch of the Army ... ground or air forces, combat or supply... GMC "Army Workhorse" power proved its ability on the toughest jobs.

Civilian GMCs benefit by the same manufacturing facilities, incorporate the same all-truck construction and feature engines of the same basic design as their military brothers ... nearly 600,000 strong. Offered in a wide range of models, chassis types and sizes, ½ to 20 tons, new GMC trucks provide war-proved performance for all kinds of peacetime hauling.

GMC "ARMY WORKHORSE" POWER

GMC TRUCKS

THE TRUCK OF VALUE

GASOLINE • DIESEL

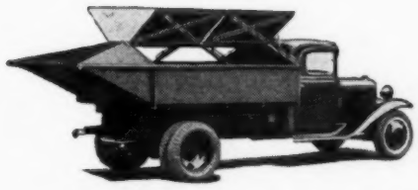
Traffic accidents have increased at an alarming rate since the war. Careless driving, jaywalking and neglect of needed repairs are mainly responsible. Do your part to prevent accidents by obeying all traffic laws ... by driving safely and walking carefully ... by having your car or truck inspected regularly, repaired promptly and properly.

GMC TRUCK & COACH DIVISION • GENERAL MOTORS CORPORATION

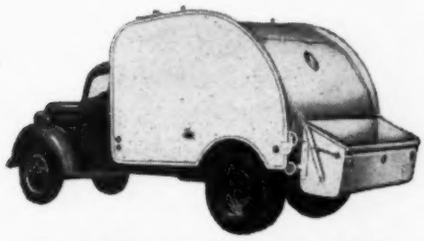
The BEST COSTS LESS

For years Gar Wood has consistently offered truck and trailer equipment of utmost utility and outstanding value. Leadership in this field resulted from this policy. Gar Wood equipment costs less in the long run because it is better built to give peak performance and lasting satisfaction.

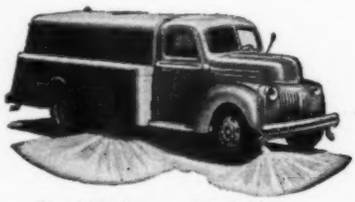
The Load Packer (patented) all enclosed garbage and refuse unit. Compresses loads hydraulically for maximum payloads.



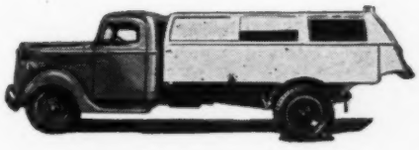
Type C28 scow end Garbage Body. Steel hinged covers extra equipment.



The new Bucket Loader, an all enclosed sanitary refuse disposal unit.

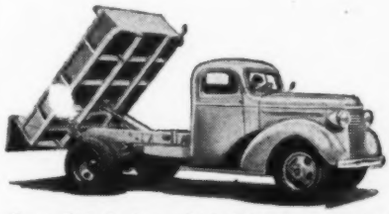


Street Flushers and Sprinklers.

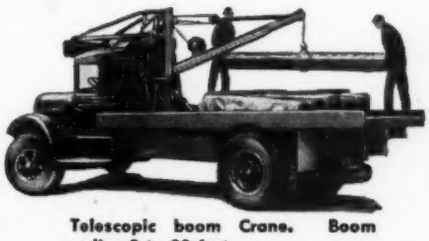


Type C50 Garbage Body with sliding steel covers on each side.

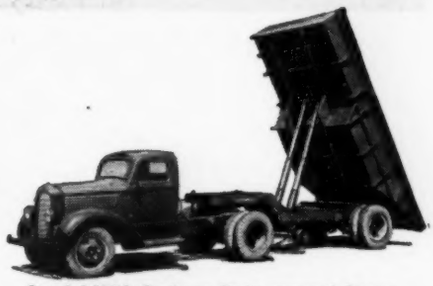
Model "QD" Tree-moving Crane. Easily erected or removed from all purpose stake body.



Type C12 Body and Model D6 or D7 Hoist. Dumping angle 55°.



Telescopic boom Crane. Boom radius 8 to 20 feet.



Special W28 Garbage Body, watertight top box. Capacity 7 cu. yds. Type T333 telescopic Hoist.

GAR WOOD INDUSTRIES, INC.

7924 RIOPELLE ST. • DETROIT 11, MICH.

WORLD'S LARGEST MANUFACTURERS OF TRUCK AND TRAILER EQUIPMENT

OTHER PRODUCTS: • TRUCK TANKS • ROAD MACHINERY • HEATING EQUIPMENT • MOTOR BOATS

Rolling again!

The Mack family—the finest bunch of truck craftsmen you can find anywhere—is back on the job . . . working together again to produce the nation's outstanding trucks.

To our employees: *"Welcome back."*

To our customers: *"Thanks for waiting."*

Naturally, it will take some time to reach full-scale production again. Many materials good enough to maintain the 46-year standard of quality of Mack trucks still aren't plentiful—but our lines are moving. We'll do our level best to get new Mack trucks and parts to you as soon as possible.

Mack MANUFACTURING CORPORATION

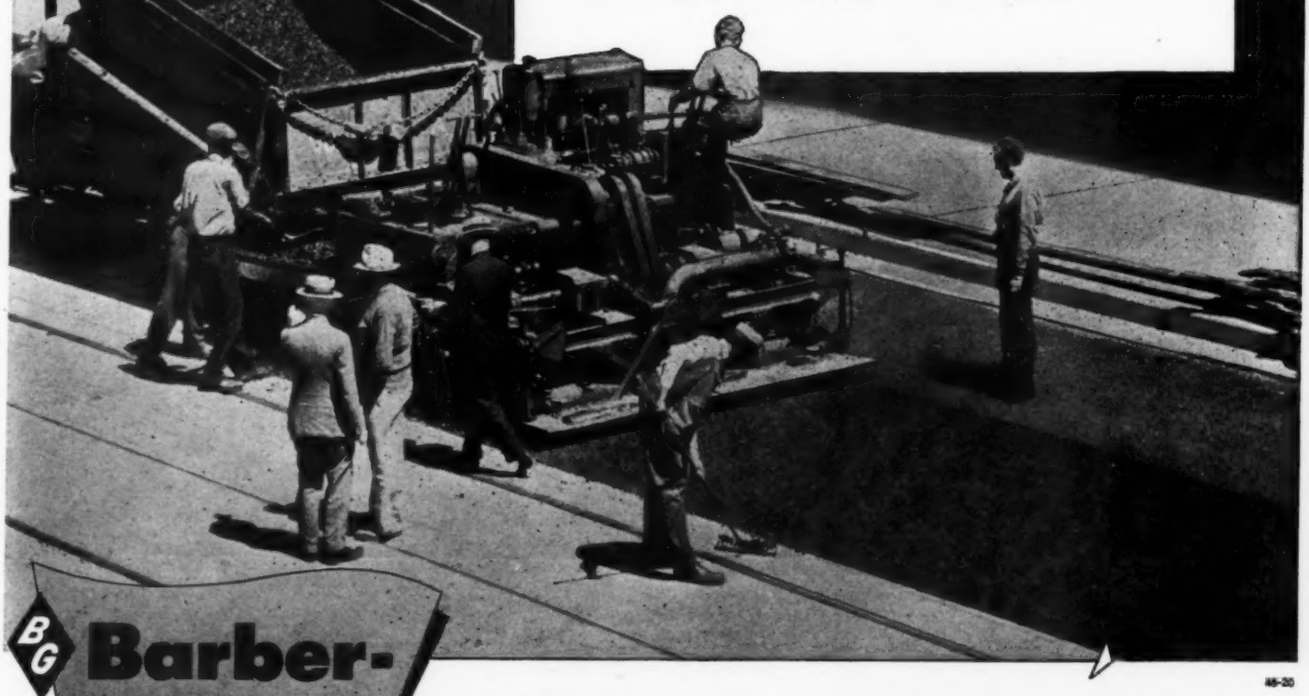
In behalf of its 67 Direct Factory Branches and 600 Dealers

How a B-G *Finisher* Eliminates New Construction

• Putting a smooth riding asphalt surface on top of neglected highways and streets is good business. Not only is the original cost of construction salvaged, thus effecting a saving to the tax payer, but a great reduction is made in construction time with minimum traffic interruption.

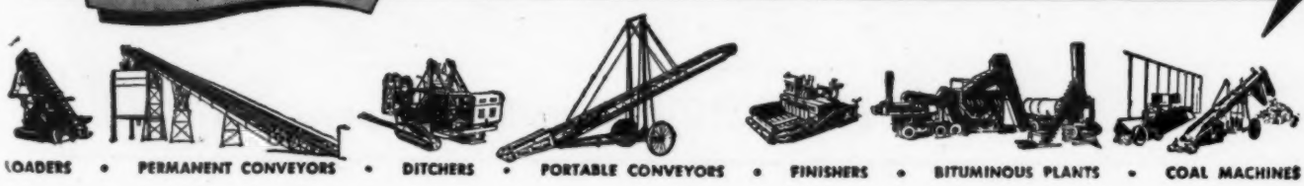
Equally important in the current construction picture is the possibility of starting such resurfacing programs with funds already available. Practically no engineering is required, releasing the Engineering Department for other vital problems. The Barber-Greene Finisher places the one- or two-course resurface directly on the original surface. It automatically levels and produces a ripple-free riding surface. The old paving is left in place and forms an ideal sub-base, resulting in an improved and more permanent street or highway.

Ask your B-G representative for more detailed information on the B-G Tamping-Leveling Finisher. Barber-Greene Company, Aurora, Illinois.



AB-20

B-G Barber-Greene CONSTANT FLOW EQUIPMENT



LOADERS • PERMANENT CONVEYORS • DITCHERS • PORTABLE CONVEYORS • FINISHERS • BITUMINOUS PLANTS • COAL MACHINES

NOW a great NEW tire to meet a great service need

LONG-LIFE SERVICE OFF THE ROAD and LONG MILEAGE ON THE HIGHWAY !

THIS is the new Road Lug tire — made to order by Goodyear for tough service operations demanding a tire built to go in OFF the road, bring out the load, then take the haul ON the highway.

In test after test — in strip mines, in rugged timber country, on tough access roads, and under punishing loads over the highway — this great husky *proved* brute enough to stand the gaff and gouging OFF the road, and roll up new mileage records ON the road. It *averaged* 33% longer tread wear and 25% longer tire life.

The reasons why are many. They include the specially designed tread that gives good traction and cut resistance OFF the road, and smooth rolling, longer mileage ON the highway. And they include heat-resistant, extra-strong rayon cord body which provides added stamina and bruise resistance in this great hauler.

See your Goodyear dealer now for full data on the NEW Road Lug — the tire that will give you new performance standards, and another big reason why *"more tons are hauled on Goodyear truck tires than on any other kind."*

Road Lug—T.M. The Goodyear Tire & Rubber Company

GOODYEAR

Road Lug Tire

— tough running mate for Goodyear's famous

HARD ROCK LUG

which is still the world's toughest work tire for straight brutal off-the-road service.

BUY and SPECIFY GOODYEAR —it pays!

ROADS AND STREETS

DECEMBER, 1946 • VOL. 89 • No. 12

Mesh-Reinforced Hot-Mix

Tried on Texas Overlay Project

Wire mesh placed experimentally on an 8.13-mile section, after test showed it successful in preventing cracks from developing over joints in old concrete base

CAN the cracks and joints in an old pavement base be prevented from "showing up" after a time through a bituminous overlay? Engineers in the Beaumont district of the Texas state highway department feel that they can. This past season they completed an extensive resurface project embodying mesh reinforcement for this purpose.

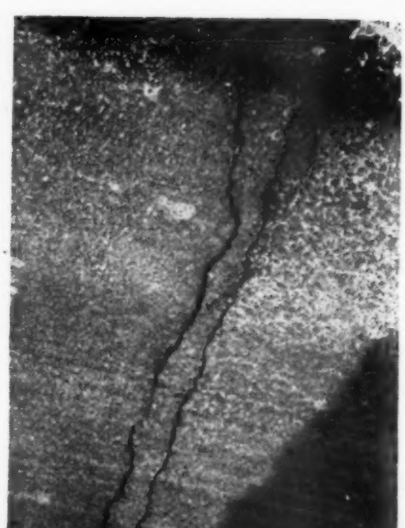
The idea began about three years ago when a section of old concrete pavement near Port Arthur was being resurfaced with 1½ in. of cold-mix, bladed on. Cracks began showing through at once, and another 1½ in. layer of cold-mix was added in June, 1945. Before placing the second layer, however, the district engineer decided to lay some 6 x 9 in. wire mesh he had on hand. He had enough to reinforce about 300 lineal feet of pavement. The section thus reinforced was marked by painting a yellow stripe along the edge of pavement over each crack and joint. A year later, not a crack had begun to show through, while cracks had sprung into sight as usual on the un-reinforced sections immediately adjoining.

On the strength of this encouragement, reinforcement was specified on the 8.13-mile section of U. S. 90

★ Finishing machine laying second course. Use of wire staples, first tried, proved very difficult. The finishing machine was then equipped with three special shoes which were attached outside of and between the tracks, to hold the wire mesh against the sheet asphalt course. These shoes, which slide along on top of the wire mesh, extend back to within a few inches of the screen

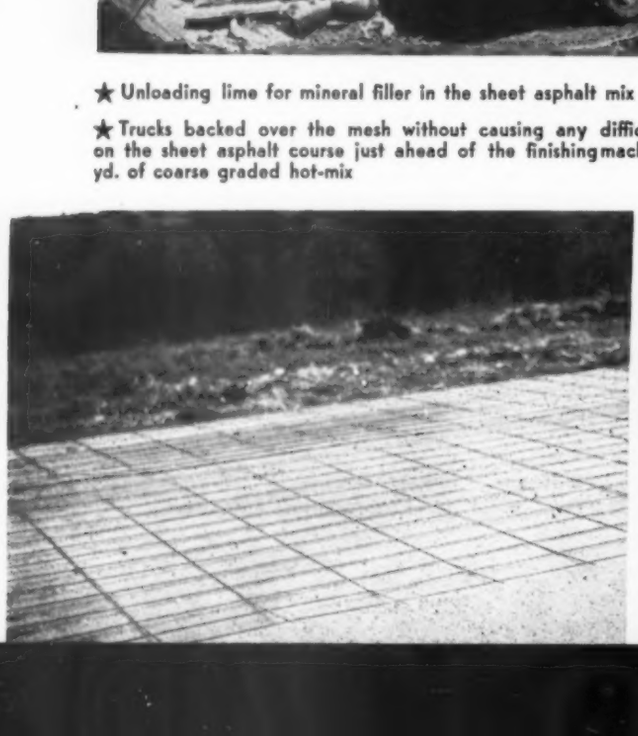
★ The asphalt plant set up for the reinforced hot-mix job by Brown and Root was a modern 75-t.-per-hr. unit, equipped with a double drum for drying shell

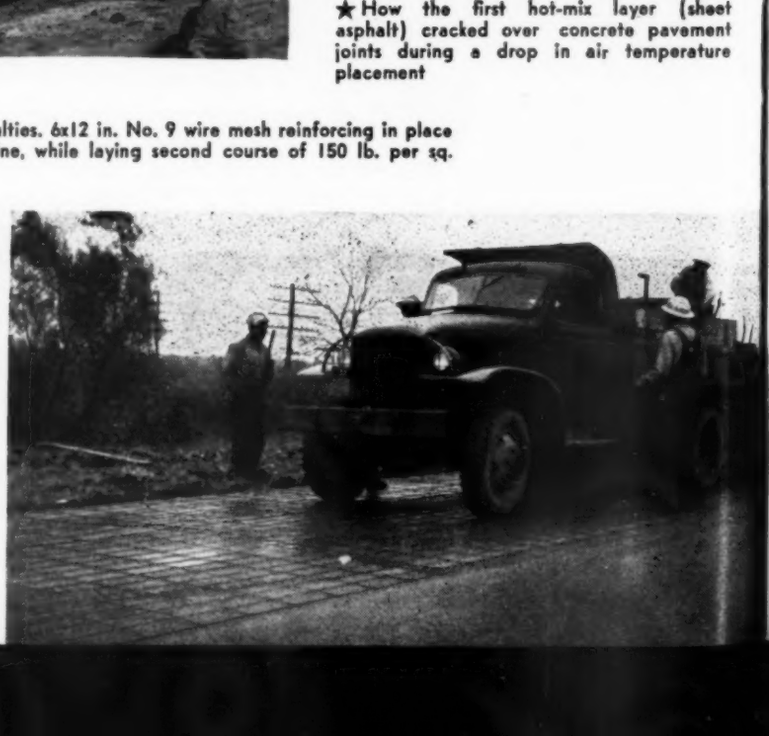
★ Unloading lime for mineral filler in the sheet asphalt mix



★ How the first hot-mix layer (sheet asphalt) cracked over concrete pavement joints during a drop in air temperature placement

★ Trucks backed over the mesh without causing any difficulties. 6x12 in. No. 9 wire mesh reinforcing in place on the sheet asphalt course just ahead of the finishing machine, while laying second course of 150 lb. per sq. yd. of coarse graded hot-mix





★ An important detail of one-lane hot-mix placement was the careful raking and feathering of the material along the center-line, to aid rollerman in getting a jointless surface

★ The man on the scales—an important fellow on hot-mix plant production

resurfaced in Liberty County this year. This road had been paved 18 ft. wide with 9-6 in. concrete, and later widened six feet on one side. The resurface procedure was carried out as follows:

(1) The old pavement, which had taken heavy traffic for a considerable period, was patched and tack coated.

(2) A 1-in. layer of hot sheet asphalt was placed and rolled full width, as a wedge course. Working half-width at a time to permit passage of traffic, the contractor first completed this course over the entire project.

(3) Preliminary to placing the next course, wire mesh was placed immediately ahead of the bituminous paver. For each half-width, two strips of mesh were laid, the eventual full width being covered with sheets respectively 4½, 7, 7, and 4½ ft. wide, or 23 ft. wide for the 24-ft. width of base. Mesh consisted of No. 9 wire spaced 6 x 12 in., coming in 16-ft. lengths.

(4) The second hot-mix course, about 1½ to 2 in. thick, was placed and rolled, followed by a third hot-mix topping 1 to 1½ in. thick.

These thickness figures are only nominal. In getting a total of 4 in. of resurface, the material quantities were eventually changed to about 125 lb. sheet asphalt, 150 lb. second course and 125 lb. surface course, the figures varying according to the side of the road since the job involved correction of the crown over the old widened pavement.

The cost of the reinforcement was computed as being approximately 15 cents per s. y. Brown & Root, Inc., of Houston is the contractor with Don Dyess superintendent. The work is being supervised by E. D. Palmer, Resident Engineer under the general direction of R. E. Kilmer, District Engineer at Beaumont.

Texas Method of Molding Asphaltic Concrete Density Specimens

AS pictured in one of the photographs taken during placement of the reinforced hot-mix resurfacing, described on the accompanying pages, the Texas highway department employs a gyratory method of preparing specimens in the field laboratory.

This method, known as THD-35, is described in a departmental bulletin issued in 1941. The stated purpose of the procedure is to produce a test specimen comparable to the pavement produced from the same mix.

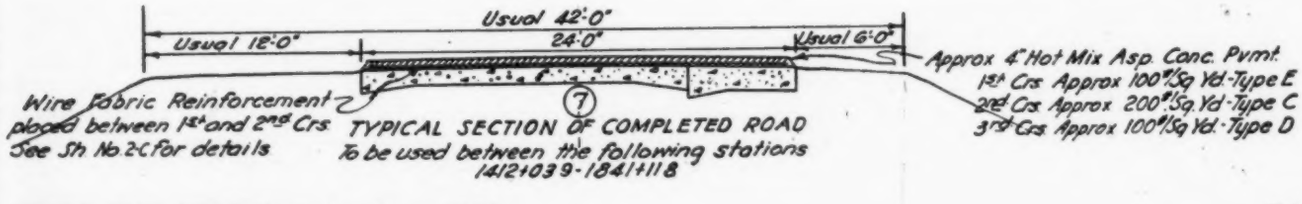
Apparatus required for the test consists of the following: laboratory asphalt press; molding assembly; torsion balance; one-half inch round-hole grate, or screen; special funnel; spatula; large bent spoon; kerosene; light lubricating oil; round gaskets (4-inch diameter) cut from 20-lb. bond paper.

Test Procedure

1. Throughout this procedure keep the valve on the line leading to the stability recorder closed.

2. Wipe out the molding cylinder with a rag lightly moistened with kerosene. Place several drops of oil on the bottom disc of the guide ring and center the molding cylinder in the guide ring. Insert the base plate with the large diameter up, and place a paper gasket over the base plate.

3. When the mix has been cured out to the predetermined volatile content at which it is desired to mold the specimen, weigh on the torsion balance to the nearest 0.5 gram an amount of the mix sufficient to make a specimen approximately 2 inches in height. If the mix contains aggregate larger than ½-in., remove this aggre-


Usual 42'-0"
Usual 12'-0"
24'-0"
Usual 6'-0"
Approx 4" Hot Mix Asp. Conc. Pvmt.
1st Crs Approx 100#/Sq Yd - Type E
2nd Crs Approx 200#/Sq Yd - Type C
3rd Crs Approx 100#/Sq Yd - Type D
Wire Fabric Reinforcement placed between 1st and 2nd Crs
See Sh No 2C for details
7
TYPICAL SECTION OF COMPLETED ROAD
To be used between the following stations
14+12+039 - 18+41+118

★ In the field laboratory, the inspector is making a mold for estimating density of the rolled hot-mix. This is done on many Texas projects by means of the "gyratory" method of molding as pictured, which gives the sample a density equal to the ultimate expected in the road with 10-ton rollers. The mold has two long welded handles, which the operator rocks slightly as pressure is applied with the hand-operated jack underneath. This gives the material a kneading action which simulates the effect of rolling. Final jack pressure 2500 lb. Three specimens (4 in. in diameter and 2 in. high) are molded each time and are used for determining the density and Hveem stability of the mix

gate from the sample by rubbing the mix through a ½-in. screen. Small material clinging to the large aggregate pieces should be rubbed off if possible. If a trial mix sufficient in size to produce only one specimen is being used, scrape the material clinging to the mixing trowel and sides of the pan into the bulk of the mix. Bring the sample to 100 ± 5° F. and blend thoroughly.

4. By means of the bent spoon and special funnel fill the cylinder approximately one-third full and press the mix down lightly with the spoon. Fill the cylinder two-thirds full and press the mix down. Place the remainder of the sample in the cylinder and press it down so that the top of the sample is level. Cover the mix with a paper gasket. Be very careful at all times to avoid segregation or loss of material while placing it in the cylinder.

5. Fasten the compression ram firmly in the reaction head of the press and center the molding assembly on the platen of the jack. Close the release valve on the jack.

6. Apply pressure until the gauge registers 50 lb. Attach handles to the molding cylinder and impart a gyratory motion to the cylinder until three complete revolutions have been made. The top and bottom of the cylinder shall be in continuous contact with the top and bottom discs of the guide ring during the gyration. Repeat application of 50 lb. gauge pressure and gyration until further movement of the molding cylinder is extremely difficult. If the proper degree of compaction has been reached, one full stroke of the jack should cause the dial pointer to move approximately 100 lb. At the conclusion of each gyratory movement, and particularly at the conclusion of the last movement, be sure that the molding cylinder is not tilted, but seats squarely on the lower guide ring.

7. Apply a gauge pressure load of 2500 lb. (1588 psi.) to the specimen at the approximate rate of one jack stroke per second. Open the release-valve on the jack, allow the platen to fall, and remove the guide ring and base plate from the assembly. Close the release-valve, fit the molding cylinder over the extraction ring and center the cylinder under the ram. Press the molded specimen out of the mold by raising the platen. Mark the top of the specimen.

8. Measure the height of the specimen (average of four measurements). The specimen shall be 2 ± 1/16-in., or 2 ± 0.06-in. high. If the height is not within this tolerance the specimen shall not be used, and the weight of sample required to produce a specimen of the proper height shall be calculated according to the following **formula:**

$$\text{Weight (grams) of sample to be used} = \frac{2W}{H}$$

Where:

W = Weight (grams) of specimen

H = Height (inches) of specimen

•

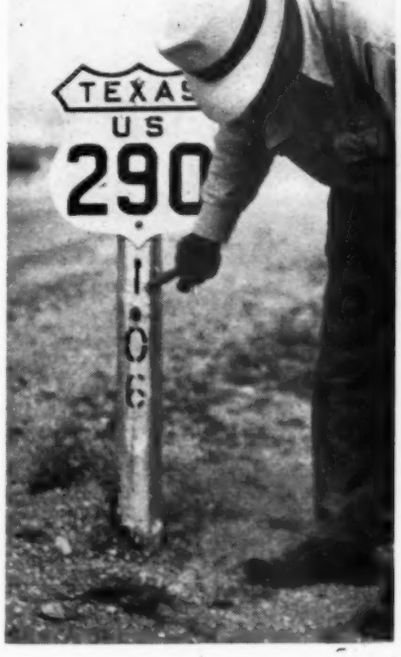
Engineering Openings With Bureau of Reclamation

The U. S. Bureau of Reclamation has announced that a limited number of openings are available for qualified mechanical, civil, electrical, and hydrologic engineers. The positions to be filled are in the Office of the Chief Engineer at Denver, which is charged with the responsibility of preparing designs and specifications for multiple-purpose projects in the Bureau's construction program in 17 western states. Salaries for the engineers range from minimum base pay rates of $2,644.80 to $4,149.60 for the standard 40-hour week. While veterans are given preference in civil service appointments, applications will be accepted from the public at large.

Inquiries concerning employment should be addressed to the Bureau of Reclamation, Room 327, New Customhouse, Denver 2, Colo.

Route 107 Miles Through One County Any County with Longer?

From Mack Hodges, district engineer with the Texas state highway department down at Yoakum, comes the accompanying photo showing how route mileage from the county line is indicated on the sign posts. The mileage number here reads "106" and actually the road is 107 miles long through Pecos County. The route



markers are spotted about one every two miles. This is an interesting variation in marker practice which Mr. Hodges passes along to us with the query as to whether any other county in the U. S. has a longer mileage on one route within its borders. The "Roads and Streets" editors took a quick look at the road atlas and spotted US 95 in Malhuer County, southeastern Oregon. Then a look at southern California seemed to settle the question. San Bernardino, Inyo and Mono counties appear to beat the 107 figure hands down, with US 66 stretching for some 200 miles within San Bernardino County.

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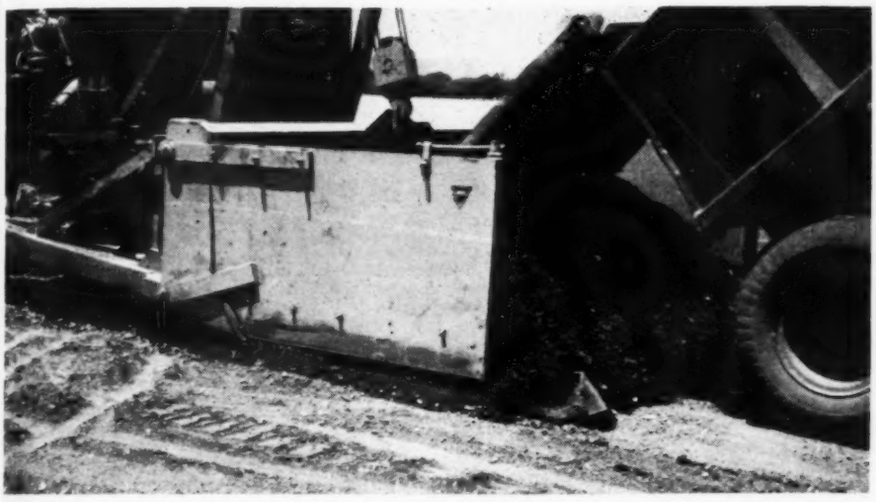
Frederickson Brothers Expressway U S 40 Sacramento—Oakland

Contractors at Work



★ A feature enthusiastically endorsed by the Frederickson men was the use of a special spreader box for placing the 8-in. granular base. The box is a "home-made" affair, mounted on a bulldozer frame using the dozer apron as a backwall. It included heavy cast steel shoes for skidding along without gouging grooves in the grade, also a roller-type pusher bar across inside the box, which contacted the rear wheels of the dump trucks as the tractor pushed the box along during tailgating. The tractor had no difficulty in riding over the well-spread material. All sizes of trucks were used, up to 23 tons. A 2½-yd. dragline with sideboards boosting the bucket to 3 yd., expedited loading of river run material

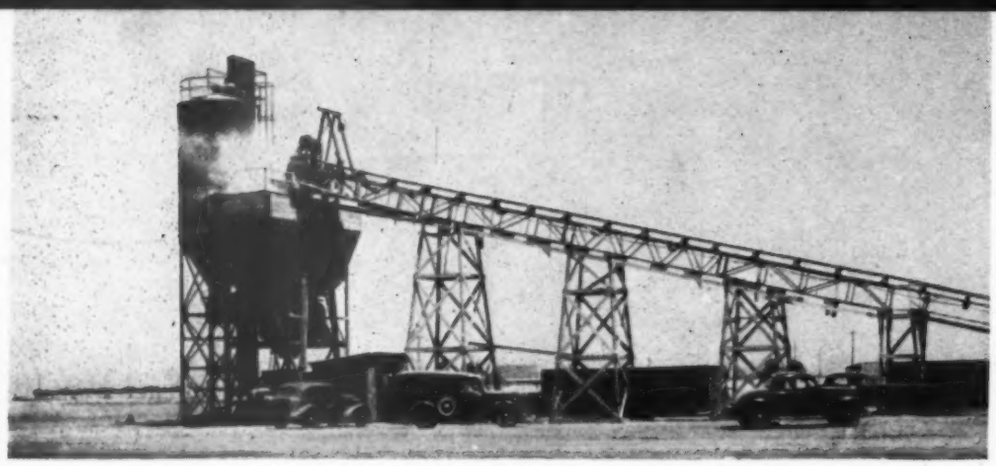
THIS leading California road builder was the successful bidder on two adjoining parcels of US 40 totaling 121 miles of express roadway between Sacramento and Oakland; combined contract figures, $1,563,000. The improvements included shallow grading (partial relocation), culverts, and several small bridges which were sub-let. A number of "squash type" corrugated iron culverts were specified where headroom was limited. Frederickson has a smooth working outfit and some nice equipment here, considering the times. The only serious hitch on equipment was the theft one night of a bulldozer, by an ambitious fellow who was soon arrested up in the North where he had assembled a sizable outfit of stolen equipment for logging. Dozer recovered.

See accompanying photos for some of the interesting methods and equipment used by Frederickson Bros.

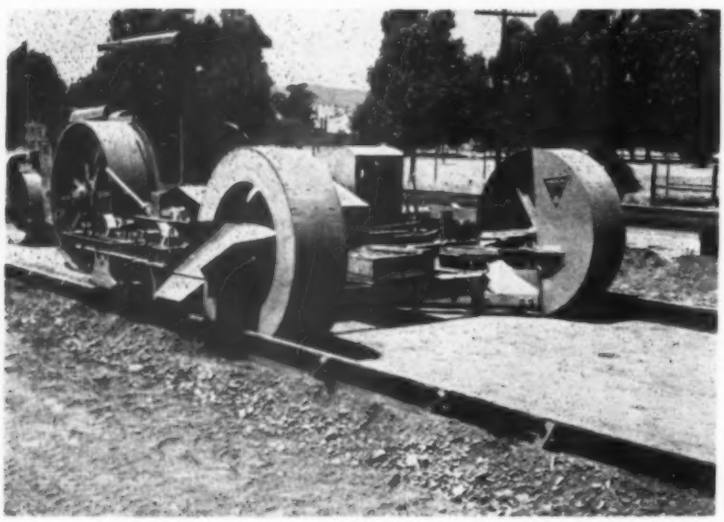
★ Glen Frederickson (center) with M. C. Martin, office engineer, and Peter McHugh, superintendent

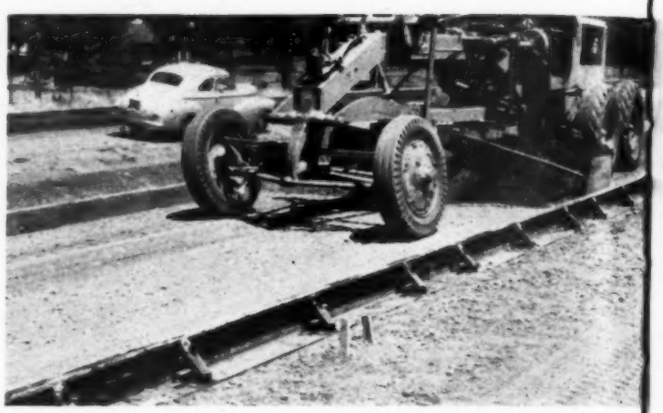
★ Over 54,000 cu. yd. of concrete was placed in the 8-in. uniform thickness pavement. Finishing was done with a traveling float finisher, followed by membrane curing, curing being subcontracted by A. J. Reed Company (Hunt Process). The 34-E single-drum paver employed, although averaging 600 cu. yd. per day, did not prove to have the output capacity on for a project of this size

[Turn page for additional scenes]

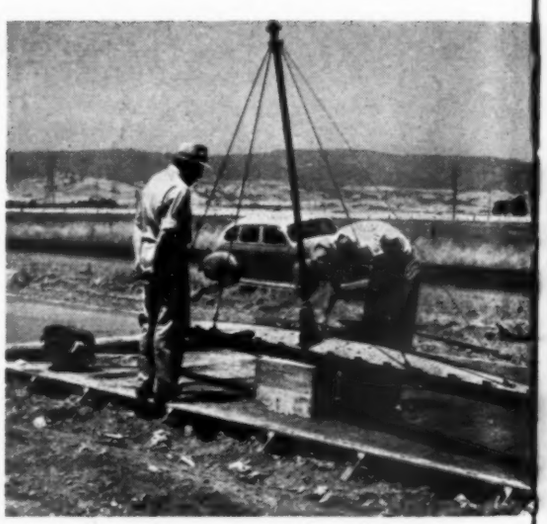


★ The concrete batch plant was fully automatic, as required in the specifications. It included a dozer trap and tunnel, the "tunnel" being a section of large corrugated iron pipe. The plant was equipped with electric-eye controlled weigh-batch. One operator ran everything with help of a belt man and dozer operator. A typical 8-hr. run was 630 cu. yd. per 8-hr. day. Much of the time the dozer was not needed, virtually unnecessary had tunnel been slightly lower

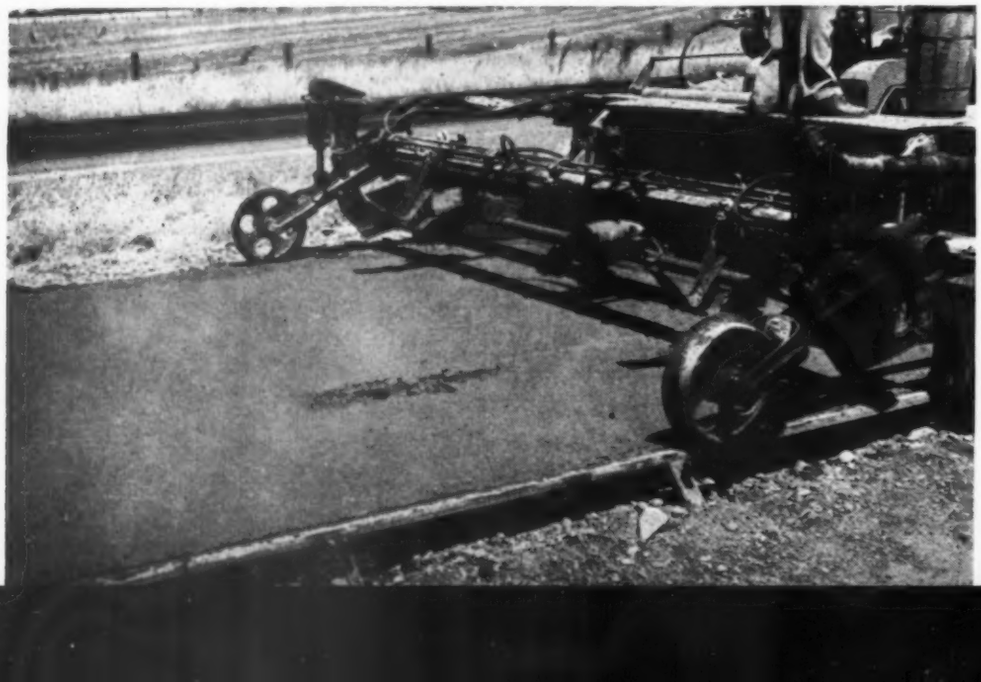




★ The fine-grader was an improvised machine, comprising salvagable parts from an old Ord finisher, Clausson wheels and A. W. French drive, used in the absence of newer equipment on order

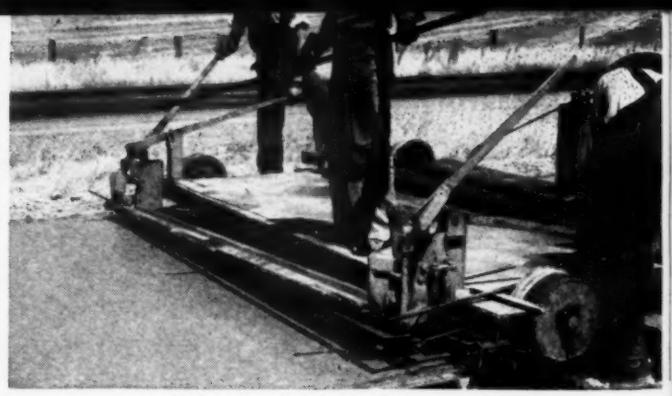


★ (Upper right): The base consisted of 8 in. of imported borrow. The fine grade was roughed out with a special grader blade equipped with end plates. Some of the road forms were 9-in. instead of the 8-in. required, in which case the depth of fine-grade was controlled by riding the blade over the forms on a shoe. Over 13,000 lin. ft. of road forms were required for 18 miles of 23-ft. pavement placed in 11 and 12 ft. lanes



★ Steel shod bump cutting float used by the engineers on the U. S. 40 California job

★ The spreader was equipped with latest-type transverse bar vibrator, mounted in front of the screed. This unit is understood to be one of the first of a new postwar model



★ Joint machine used to cut grooves at measured intervals of 15 ft. by forcing 1¼x¼x3/16 in. tapered plates down with levers. No expansion joints employed in this Standard California design, except for fibre joint on each side of culverts and at other special points

How They Bid on the California U.S. 40 Project Pictured on Foregoing Pages

Project: Grading, portland cement concrete paving and structures for about 6.1 miles of express roadway, US 40, between town of Midway and point two miles north of Dixon, Calif. Includes two creek bridges. Awarded Jan. 17, 1946, to Frederickson Bros., Emeryville, Calif. Figures not given for an adjoining 6.0 mile project, awarded to same contractor at $527,735 with comparable unit prices.

(1) Frederickson Bros., Emeryville, Calif....$1,035,012.36
(2) A. Tiechert & Son, Inc., Sacramento.... 1,038,938.05
(3) Frederickson & Watson Construction Co., Oakland 1,123,607.66
(4) Harms Bros., Sacramento..... 1,173,529.10
(5) M. J. B. Construction Co. & Bressi & Bevanda, Constructors, Stockton..... 1,196,942.80
(6) Parish Bros. 1,198,869.90

	Item and Quantity (Partial List)	(1)	(2)	(3)	(4)	(5)	(6)
280	Cu. Yd. removing concrete	3.00	3.35	5.00	3.00	3.50	3.50
324	Sta. clearing and grubbing	10.00	30.00	12.50	12.00	20.00	8.00
30,500	Cu. Yd. roadway exc.	.33	.31	.50	.35	.50	.28
143,000	Sq. Yd. compacting orig. ground	.02	.025	.045	.03	.04	.04
4,400	Cu. Yd. structure exc.	1.95	2.40	1.90	2.00	1.80	2.00
2,830	Cu. Yd. ditch and channel exc.	.60	.70	1.20	1.00	1.50	1.25
3,000	Sta. Yd. overhaul	.01	.004	.02	.02	.02	.005
275,000	Cu. Yd. imported borrow	.60	.62	.70	.68	.70	.81
220,000	Tons imported sub-base material	1.20	.92	1.18	1.60	1.32	1.28
158,800	Sq. Yd. preparing sub-grade	.08	.10	.10	.12	.10	.10
	Dev. water sup. and furn. watering equip.	3,500.00	1,000.00	5,000.00	13,250.00	5,000.00	14,000.00
26,500	M. gals. applying water	1.40	1.50	1.50	1.50	1.50	1.25
324	Sta. finishing roadway	10.00	12.00	10.00	10.00	16.00	16.00
1,250	Cu. Yd. salvaged surfacing	1.50	1.34	.60	1.50	1.80	2.95
13,900	Tons crusher run base	2.00	3.05	2.70	2.75	2.76	2.45
176	Tons liq. asph. SC-2 (pr. ct. and pen. tr.)	22.00	25.00	23.00	22.00	22.00	20.00
134	Tons asph. emuls. (pt. bdr., armor ct. and seal ct.)	24.00	26.50	24.00	30.00	25.00	23.00
1,915	Tons screenings (armor ct.)	4.40	5.00	4.80	4.50	4.50	4.75
63	Cu. Yd. sand (seal ct. and prime ct.)	4.50	5.00	6.00	5.00	6.00	6.50
1,685	Tons mineral aggr. (P.M.S.)	5.60	5.00	6.00	5.00	5.50	5.00
86	Tons paving asph. (P.M.S.)	16.50	20.00	15.00	22.00	17.00	18.00
350	L. F. raised bars	1.10	1.20	1.15	2.00	1.00	1.25
35,810	Cu. Yd. class "B" P.C.C. (pavement)	9.30	9.65	9.87	9.00	11.00	10.75
1,340	Cu. Yd. class "A" P.C.C. (structures)	37.00	42.00	46.00	36.00	40.00	43.00
25	Cu. Yd. broken conc. rip rap	7.50	7.20	7.60	10.00	10.00	25.00
55	Cu. Yd. class "A" P.C.C. (curbs)	40.00	52.00	30.00	60.00	35.00	45.00
115	Each monuments	4.00	4.00	3.50	4.00	4.00	4.00
892	L. F. timber bridge railing	2.20	2.25	2.50	2.50	2.50	3.25
170	L. F. salvaging metal guard railing	.60	.90	1.00	1.00	1.00	1.00
115	Each culv. markers and guide posts	2.75	2.00	3.00	4.00	4.00	3.00
10.1	Mi. new prop. fence Type "A"	770.00	1,120.00	940.00	800.00	800.00	900.00
0.8	Mi. new prop. fence Type "B"	800.00	1,440.00	1,200.00	800.00	1,000.00	950.00
0.3	Mi. new prop. fence Type "C"	1,000.00	1,300.00	1,300.00	1,000.00	1,000.00	1,200.00
21	Each drive gates	30.00	24.00	33.00	25.00	35.00	25.00
407	L. F. 18" R.C.P. (Std. Stc.)	2.25	3.00	2.25	3.00	2.80	2.45
164	L. F. 8" C.M.P. (16 ga.)	1.00	1.00	1.30	1.25	1.50	1.35
20	L. F. 12" C.M.P. (16 ga.)	1.37	1.40	1.60	1.50	1.80	1.55
390	L. F. 18" C.M.P. (16 ga.)	2.00	2.20	2.25	2.00	2.50	2.25
136	L. F. 48" C.M.P. (12 ga.)	8.00	8.25	8.90	9.00	8.40	8.75
143	L. F. 60" C.M.P. (10 ga.)	13.00	14.00	11.80	15.00	15.00	12.30
824	L. F. 24" C.M.P. (siphon 14 ga.)	4.34	4.50	3.90	5.50	5.00	3.50
38	Each field joints	13.20	34.00	13.40	10.00	20.00	12.00
1	Each removing and resetting headwall	100.00	60.00	20.00	40.00	100.00	65.00
108	L. F. 13½"x21½" corr. met. arch pipe (14 gal.)	2.70	3.00	2.60	2.50	3.00	2.75
3,993	L. F. 17"x30" corr. met. arch pipe (12 gal.)	4.40	4.35	4.27	4.00	4.60	4.40
156	L. F. salvaging pipe culv.	1.00	1.00	1.00	1.00	1.00	.95
44	L. F. relaying salv. C.M.P.	1.00	1.00	1.00	1.00	1.00	.95
1	Each 12" automatic drainage gate	13.20	15.00	35.00	25.00	25.00	18.00
1	Each 18" automatic drainage gate	26.40	30.00	40.00	40.00	35.00	35.00
2,800	L. F. furnishing conc. piles	2.64	3.08	2.50	3.00	3.00	2.20
100	Each driving conc. piles	62.15	74.00	80.00	78.00	75.00	75.00
233,000	Lbs. furnishing bar reinf. steel	.039	.04	.03	.025	.035	.036
233,000	Lbs. placing bar reinf. steel	.011	.02	.02	.03	.02	.018
25,820	Each pavement tie bolt assemblies	.52	.55	.55	.53	.60	.60
22	Each cast steel frames and covers	49.30	75.00	70.00	50.00	60.00	75.00
	Misc. items of work	1,320.00	1,440.00	1,400.00	2,000.00	1,500.00	1,600.00

Hook, Deputy Asst. Administrator for Airports

H. Arthur Hook, veteran of nearly 20 years service with the Civil Aeronautics Administration and its predecessor organizations, has been appointed Deputy Assistant Administrator for Airports, T. P. Wright, Administrator of Civil Aeronautics, announced. Mr. Hook will serve in Washington under Charles B. Donaldson, Assistant Administrator for Airports, in the management of the federal government's share of the billion dollar airport program. He has been Assistant Administrator of the CAA's sixth region at Santa Monica, where he served as Administrator while Joseph Marriott was in active military service.

★ The new stabilizer nearing the end of a work section, which was 400 to 500 ft. for a day's processing on 150-ft. wide runway. The stabilizer mixed successive lanes in alternate direction, working from one edge

Modern Stabilization Methods

Step up Soil-Cement Placement on Texas CAA Airfield Job

How 18-man crew using 14 machines (including trucks) placed as high as 8400 sq. yd. in 8½ working hours with no previous experience with this type of construction

SO MANY highway and airport jobs lately have been tackled with just any old equipment the contractor can assemble together, that it's a real pleasure to see some of the postwar machinery models beginning to do their stuff. Such a demonstration was witnessed during September on a Texas airfield. The project was the Rusk County Airport near Henderson, a CAA project involving 93,400 sq. yd. of surfacing in two L-pattern runways and taxi strips. The machine was P & H's new "Single Pass" stabilizer.

The Rusk County field was designed to serve a small but progressive county-seat town in the rich East Texas farming and oil-field area. It is typical of airports which will soon blossom out by the scores and hundreds in the national postwar program. Runways are 3,000 ft. in length, and 100 and 150 ft. wide, respectively. Taxiways are 50 ft. wide.

In designing the field for light planes, the engineers made every effort to utilize local materials to the fullest, and alternate bids were taken last spring on iron-ore gravel and soil-cement. The latter was selected on the low bid of Lank Engineering and Construction Company, Shreveport, Louisiana, with Stroud Brothers, Joinersville, Texas, handling the major portion of the grading work and the Austin Contracting Company of Dallas performing the soil-cement processing. The original contract included a bid item of 25 cents per sq. yd. for soil-cement processing. The complete in-place cost of soil-cement, including cement, was about 55 cents per sq. yd. The soil-cement compacted thickness specified was 6 in. for the runway, and 7 in. for the 500 ft. runway ends, taxiways and turnaround areas.

Fine Sandy Loam

The soil on the site consisted uniformly of a fine sandy loam top soil underlain by fine sandy loam to considerable depths. About 175,000 cu. yd. of earth excavation was required. Top soil was saved and placed on the graded cut and fill areas, and the entire base and subgrade construction made with B horizon material, which was found to require about 1% less portland cement than the top soil for a good soil-cement base. Tests showed that when properly drained this material would make an excellent subgrade, but that it quickly developed quick-sand characteristics when saturated. Due to this fact plus a rather high capillary rise, Stroud's tractors and pans sometimes "drop-

★ Soil cement was mixed in 9-ft. lanes. The operator is sheeps-footing the last two lanes processed, taking care to obliterate all signs of a joint

★ Shaping with a blade is the next finishing operation after sheepsfoot rolling, the operator again taking two lanes at a time

up hillside cuts.

At other times, sprinkling was necessary for raw soil compaction. Sheepsfoot rollers were followed by a truck equipped with a splash plate rather than the usual spray bar.

Included in the contract was the installation of 1650 lin. ft. of coated corrugated pipe storm drains, 18 in. to 36 in. in diameter.

How Job Was Done

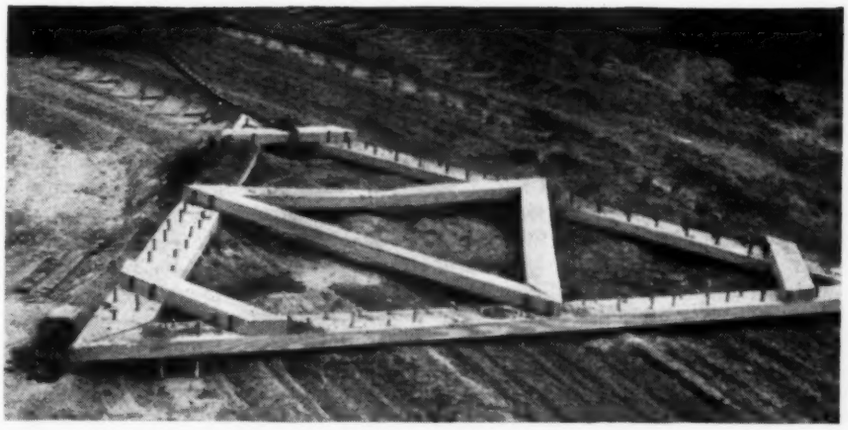
Stroud's crew topped out the job and fine-graded, after which the Austin Contracting Company men took over. This set-up called for some nice cooperation. Stroud found that particular attention had to be given toward getting the proper strike-off elevation of raw soil. At first his men had a tendency to grade too low, but subsequently set their power fine grader to strike off about one inch above the finished grade.

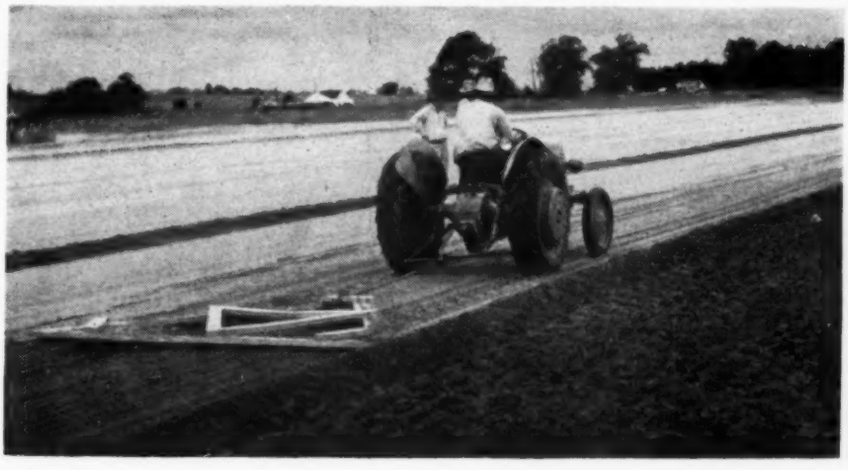
Soil-cement processing was performed in 9-ft. lanes. The scheme of work was to lay out a section of runway that could be processed in one day. Sections ranged from about 400 to 500 ft. long for the 150-ft. width and up to 600 ft. for the 100-ft. width. Gaps about 40 to 50 ft. long were left between work sections as turn-around areas for equipment. These areas were later processed cross-wise with the centerline, a day being devoted occasionally to such clean-up. The ends of each day's work section were subsequently trimmed before cross-processing turn-around areas by making a dry pass with the stabilizer.

Whenever possible the contractor tried to start mixing operations at 7:00 a. m., mix until about 3:30 p. m., then use the rest of the day for finishing and applying the cover. Some days, due to delays in cement, etc., work could not begin until later. The trick was to lay out the right length of runway for utilizing the remaining time.

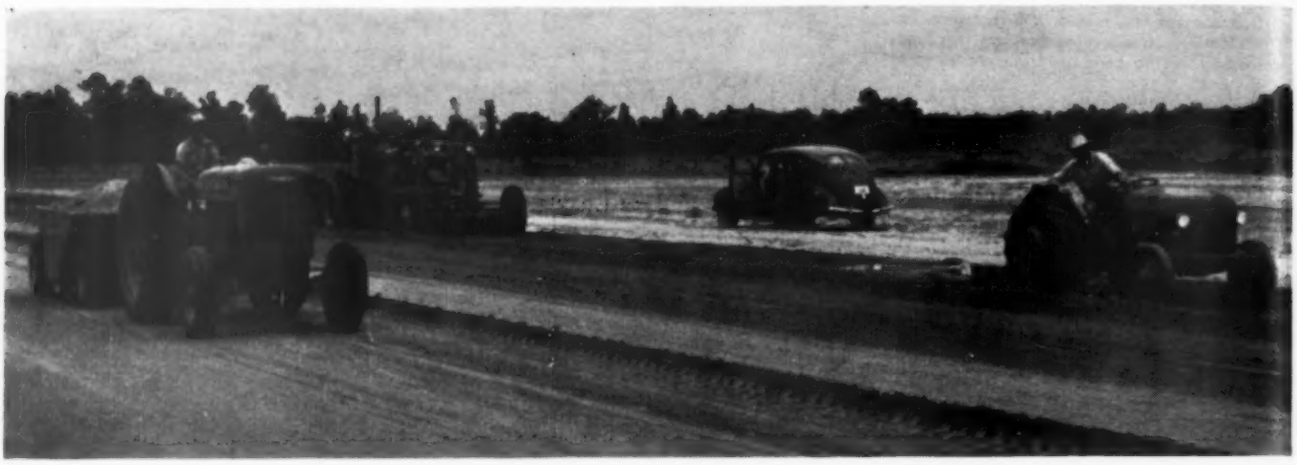
How Cement Was Spread

Eight per cent of cement by volume was used throughout the job. As the first step in processing, bulk cement was spread on the loose raw soil, using a tow-type spreader box.





★ Third step behind the stabilizer—nail dragging to remove surface compaction planes



★ Fourth step—pneumatic rolling, with sprinkling in conjunction when the engineer deemed it necessary

★ (Left): Tight blading was done for the purpose of spoiling a thin layer of inferior top material across the runway from lane to lane ahead of final finishing. (Right): Light sprinkling along with pneumatic rolling

This box, a well-known commercially made unit, was originally designed for spreading coarser material than cement, and its hopper screw is normally activated from two rubber-tired traction wheels. The uncompacted grade, consisting as it did of fine fluffy material, caused some difficulties at first. But with the addition of four more rubber-tired wheels (see photo) and use of tandem tow trucks, spreading soon ran smoothly. For greatest accuracy, cement was spread in two layers or passes. The total cement spread, about 40 lb. per sq. yd. for a 7-in. depth and 34 lb. for 6-in, depth, usually checked out within one pound.

It was agreed that this job needed some kind of positive-action cement spreader. It is understood that the contractor, as well as at least one equipment manufacturer, is working on the development of such a unit. Slot-type spreaders, while readily adaptable, have not always worked perfectly with such a fine, dry material as cement, in the opinion of the men on this job.

Bulk cement was delivered to a siding in side-door box cars and unloaded into dump trucks with a small truck equipped with a front-end scoop. Four dump trucks were required to keep the job moving.

One Mixing Pass

After cement spreading was well under way, then began the real "show", the operation of the new once-over power stabilizer. This machine is a one-man affair. It travels on crawler treads, processing at any desired rate up to a speed of 31 ft. per minute, which speed was an easy matter on this project. The working end of the stabilizer consists of a specially designed high-speed

★ At the beginning of each run, a man from the cement spreader crew attached the push bar, and coupled water hose to tank wagon while stabilizer was in motion

★ (Left): Inspector with a hand trowel, taking samples from full depth of loose mixed soil-cement for visual check on mix. (Right) Cross-processing a turn-around area.

cutting rotor under a hood, which works to a closely controlled predetermined depth and pulverizes the soil fraction and disperses the cement and moisture thoroughly. The engineers on this job characterized the resulting mix as being practically to laboratory uniformity. Water is added at the desired rate from a pushed tank wagon through spray bars in the machine and thoroughly dispersed through violent pugmill agitation. Apparently the machine works satisfactorily at all moisture contents required. An important feature is an automatic shut-off which acts whenever the unit stops, thus obviating wet spots.

While on the subject of water, it is noted that the 11.3% optimum moisture content of the mix was the percentage actually aimed for in processing. Often with some soil-cement work it is deemed best to begin processing with a mixture one or two per cent above optimum. On this job, due to high percentage of fines and low operating losses such practice resulted in wet spots which did not compact satisfactorily, so the water content was reduced to slightly above optimum.

On the regular work sections the stabilizer processed successive lanes in alternate directions, working from one side of the runway to the other. In cross-processing turn-around areas, however, the machine which was quite maneuverable was brought around after each pass and worked all lanes in the same direction.

Compaction and Finishing

One of the job-simplifying features of this stabilizer is that through a simple tail gate adjustment the material is spread out flat to desired depth. No windrow to blade out. The lone sheepsfoot roller seen on this job crowded close behind. Whereas it is customary to have two or more sheepsfoot units on even a fairly small job of this kind, the contractor had no trouble at all in getting the required density with one dual-drum unit. This unit was mounted in front of a medium weight track-type tractor operated as a high-speed and highly maneuverable outfit.

Probably an average of ten passes was necessary for compaction before the blade and pneumatic roller took over for finishing.

The compacting and finishing were performed about as follows: the first two lanes were mixed and sheepsfooted. While the next two lanes were being mixed and sheepsfooted, the first two were shaped with a blade, nail dragged to remove any surface compaction planes, sprinkled if necessary with a spray bar, and then pneumatic rolled. The first two lanes were then tight bladed, the excess material being bladed off and left in a small windrow approximately 18 in. inward from lane 3. This was done to allow the joint between lanes 2 and 3 to be rolled out with the sheepsfoot, thereby obliterating all signs of a joint. After lanes 3 and 4 had been processed and sheepsfooted, finishing operations

(*Continued on page* 81)

★ (Left): Cement being spread over a lane of loose raw soil, using an adapted spreader box. (Right): The single wheels of the spreader box were changed to triple wheels, for better traction in the uncompacted raw soil

EDITORIAL

★ Expressways vs. Utilities

The music of the pavement breaker will not be heard in the wake of the paver on California's new expressways. A policy announced some time ago by the highway commission rules that longitudinal encroachments for underground utilities will not be permitted on full expressways. In other words—no sewers, water lines or underground wiring under the pavement or any other part of the right of way. Utilities may be allowed to cross beneath expressways, but the division of highways will prescribe where. The line will require encasement in a conduit designed so that future replacement can be made by threading or jacking, thus eliminating any possibility of those peacetime bomb craters and mole-like disturbances so familiar on ordinary city streets, or else the utility must guarantee that no entry will be made. In other words, there'll be no openings for repairs.

Revocable permits will be issued for utilities under other highways than expressways where there is sufficient right of way space to accommodate them. Also, utility companies and municipalities have been assured that a reasonable attitude will be taken in granting occasional exceptions on expressways such as running a sewer line across a right of way corner where it will save an expensive detour.

This statement of policy is indeed a forward looking step, and the California engineers are fortunate in having back of them a court decision of some years' standing, which rules that a private utility must move pipe lines off of a new highway right of way at its own expense. Other highway departments which have not settled this important matter have reason to get busy. It is expensive and inconvenient enough when an ordinary arterial street is opened for sewer repairs. Where seventy thousand vehicles a day stream along, interruption becomes unthinkable.

Taking parallel lines out from under the pavement proper only partly meets the problem. They should be eliminated from the right of way whenever feasible. Otherwise, there will still be the possibility of having periodically to trench into landscape slopes. But this detail is far overshadowed by the question of providing space for the utility in the first place. California utilities already occupy free highway space that would cost the companies millions of dollars to purchase. Some counties and cities assess rental for the privilege of traversing such public domain.

Land cost for urban expressways is often a million-dollar-a-mile proposition and even a strip a couple of feet runs high. A state which provides this space gratis, just because the utility companies expect it, is a party in a form of highway fund diversion. California highway engineers reason that the state in such event would be spending gasoline tax funds for non-highway purposes, something it is specifically forbidden by law to do.

Moving mazes of piping and wiring is a costly and time consuming task for the utilities, and full consideration must be given to their side of the problem. Utility requirements often are a major factor in determining expressway design and location, and utility complications may rule out depressed construction. The present task of the telephone company in relocating trunk broadcasting cables on the Hollywood Parkway at Los Angeles—where incidentally a year's notice was given the phone people—is an example of the difficulties run into.

The point of this little piece is broader than just the matter of utilities. It has to do with leadership and seeing ahead. Realizing that expressways represented perhaps the most acute postwar need, California highway leaders put all available personnel on expressway surveys and design, and all through the war made good progress in spite of manpower shortage. The state law makers as a result of sound advice passed far-seeking legislation on limited access. Financing problems were anticipated well in advance. As a result California today probably has detailed plans ready on more millions of dollars' worth of expressways than any other state. Let's move out west.

★ User and Engineer Cooperation

For the first time in Michigan highway history the state, counties and cities have united with a road user group on a state-wide cooperative fact finding survey and action program. Present and future highway and street needs are the subject of the research. Made under the leadership of the Michigan Good Roads Federation, of which Otto Hess of Grand Rapids is president, the survey has been launched in recognition of critical factors, including the rising tide of fatalities and prospective doubling of highway travel. Urban congestion is also a factor. The need for replacement of thousands of miles of obsolete trafficways with modern, safe roads and streets calls for concerted action in the face of rising construction costs.

Don B. Smith of Detroit is chairman of the highway study committee, which also includes state highway commissioner Charles M. Ziegler, Mayor Ralph Crego of Lansing, LeRoy Smith of Wayne County, Richard Harfst of the Auto Club of Michigan, and Walter Toebe, representing contractors. J. P. Buckley has been retained as engineer-manager. It is understood that the Public Roads Administration has pledged financial assistance to the project as well as the loan of technical personnel.

This type of joint effort will be watched with interest. Engineers and officials charged with planning can never get too close to the public, often they find it difficult to sell their programs that determine true local public need.

Full-scale Tests Checked Design of

Expressway Gutter Inlets

This interesting experimental project aided in determining proper gutter depth and inlet spacing for a special flare-type cast iron inlet

By E. C. Woodward

Engineer-Manager, Fort Worth Expressways, Texas State Highway Department

THE pavement design for the Fort Worth freeways provides for a 0.02 ft. slope per foot across and a 4-in. rolled curb on each side of 24-ft. pavements, as indicated in Fig. 1.

In order to keep storm water from reaching an objectionable depth on the outside driving lane, it became apparent that curb inlets for the removal of the storm water would have to be spaced at unusually short intervals. The usual types of inlets requiring a catch basin or inlet box are rather expensive, and due to the small amount of water to be handled by each inlet, the use of the usual types was not considered necessary on the freeway proper. On account of the large number of inlets required, a study was made of several different types in an effort to develop an inlet of maximum efficiency that could be constructed at a reasonable cost. After drawing up several different types, it appeared that a cast-iron flare, as shown in Fig. 2, would probably be the simplest and most economical type to use. Fig. 2, Section A-A, shows the method of installing and connection to the storm sewer.

Full Scale Model

To obtain some factual data regarding the capacity and efficiency of these inlets, a model was constructed to full size, representing a 7-ft. width of the outside expressway pavement, by 20 ft. of length. Near one end of the model, two 3 by 26 in. openings were made in the curb separated by 21 in. of curb. Beginning one foot above first opening, the gutter was warped down one inch in one foot in front of inlets to turn the water in.

The model was set on a large trailer and the various per cents of grade obtained by raising or lowering one end of the trailer. Water was supplied from two water tanks and a fire hose which developed a total of about 0.45 c.f.s.

In making the test, water was turned on at the upper end of the model and allowed to reach full flow along the entire length of the model. Three 55-gal. drums on pipe roller were then rolled under the spouts of each inlet and a spout catching the water that flowed past the inlets. This operation was timed by stop watch. Usually the drums were allowed to catch water for about 10 seconds. The water was then weighed and the rate of flow (c.f.s.) passing through each inlet calculated as well as volume bypassing both inlets. Four to five tests as described above were run for each of the following road grades, 0.5%, 1.0%, 1.5%, 2% and 3%.

The results of these tests are shown in Table 1.

The column showing percent efficiency of each inlet was arrived at by dividing the cu. ft. per sec. passing the inlet by the total cu. ft. per sec. flowing down the pavement.

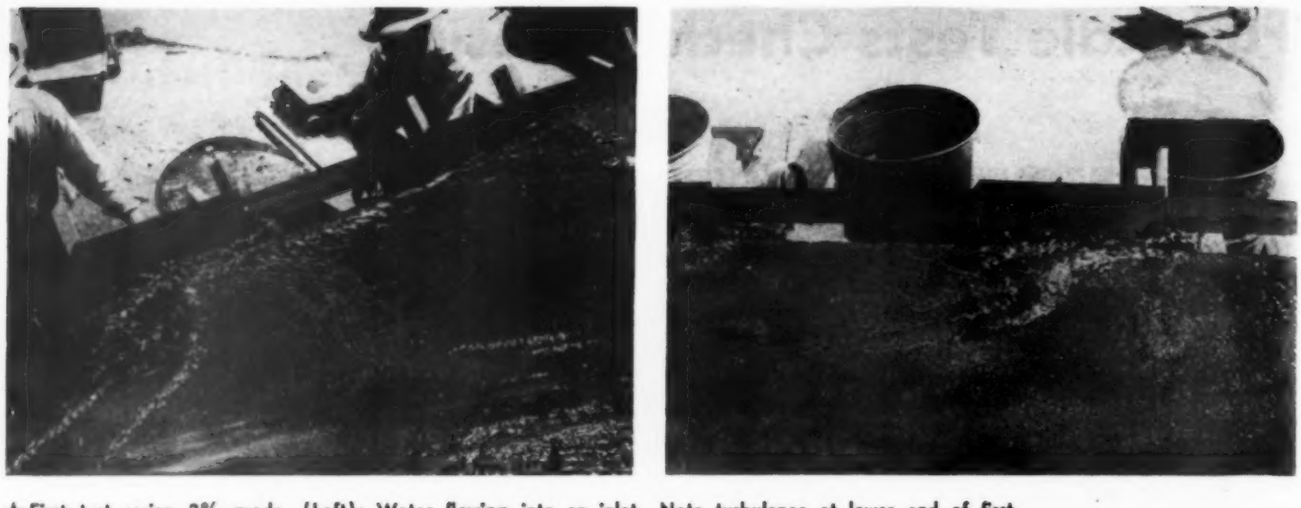
Results of Tests

The first series of tests run indicated that some improvement might be made in the entrance to the inlets by forming a 2 x 3 in. trough in the curb, as indicated in Fig. 2. With the entrance to the inlets revised as illustrated, another series of tests was run, the results of which are given in Table 2. It will be noted that the changes made in the entrance or mouth of the inlets increased their efficiency from 11% to 35%, depending on the percent of the road grade.

After the second series of tests was run, the entrance or approach was again revised by taking out the 1-in. drop in the foot of area adjacent to the inlet.

This last and final series of tests

★ How water tanks were mounted to supply the test flow

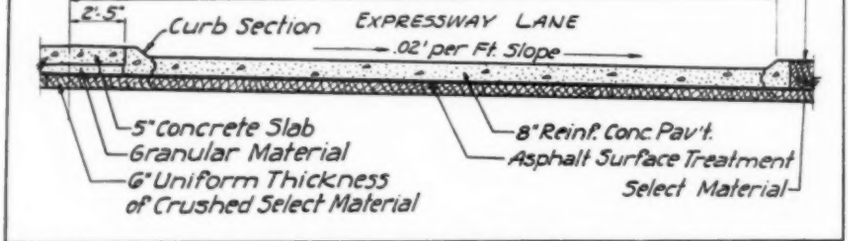


★ First test series, 2% grade. (Left): Water flowing into an inlet. Note turbulence at lower end of first opening. (Right): Turbulence between 1st and 2nd openings

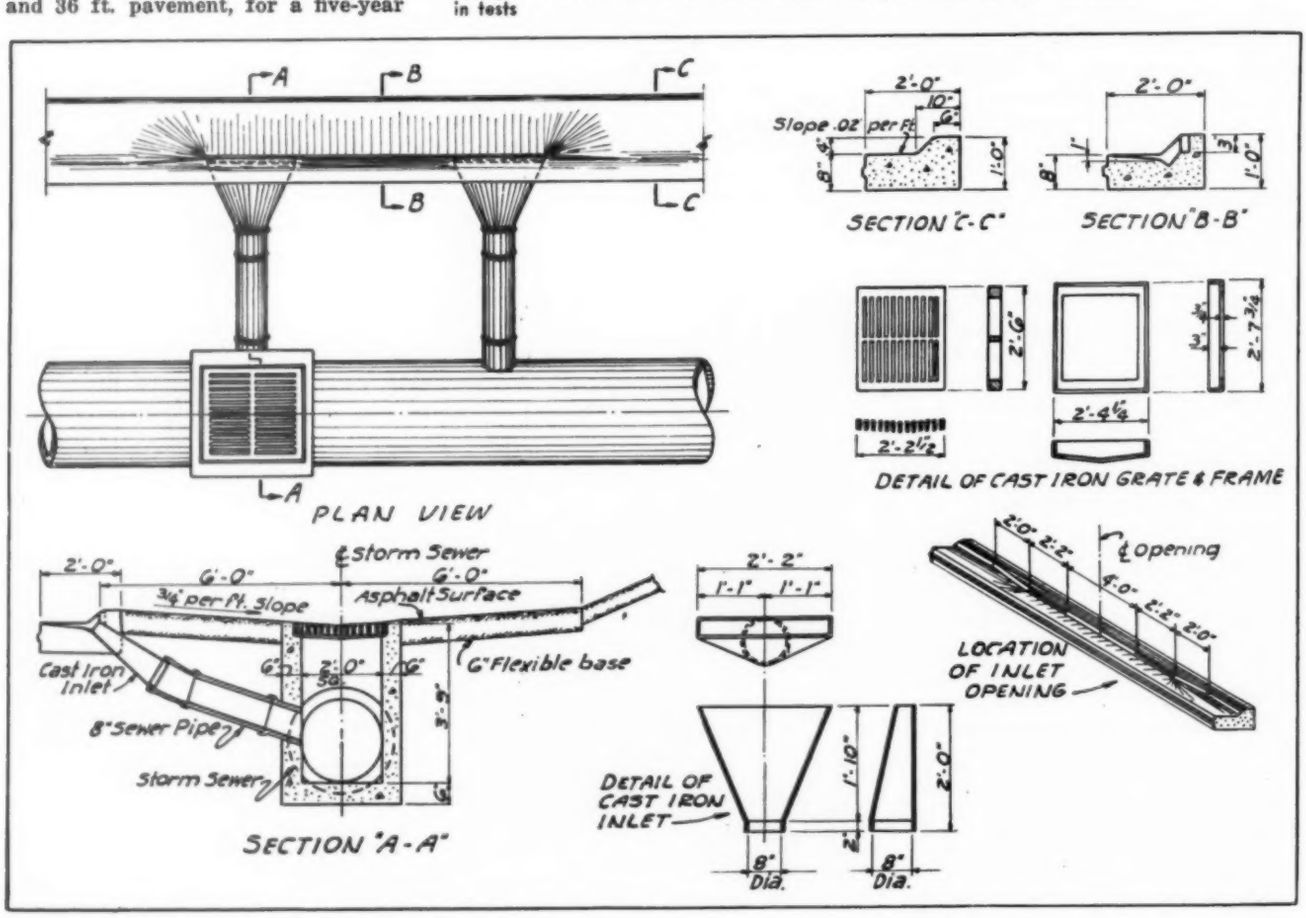
indicates that the 1-in. drop in the gutter had contributed from 10% to 40% to the efficiency of the inlets entrance.

Results of this series are shown in Table 3. From this information, curves 1, 2 and 3 in Fig. 3 were plotted, showing the efficiency of the inlets using each of the above described entrance designs.

Fig. 4 is a run-off curve for one-half width of the freeways for a 24 and 36 ft. pavement, for a five-year



★ Fig. 1. Cross-section of 24-ft. expressway pavement design involved in tests



★ Fig. 2. Details of cast iron inlet and typical installation

frequency. Fig. 5 shows the relation between gutter velocity, depth of flow in gutter, and capacity of the gutter in cubic feet per second, flowing at various depths, for various road grades.

Fig. 2 also shows the recommended design of the inlet, and entrance, which the above tests indicate will produce maximum efficiency.

We had at first thought that the spacing of the inlets should be such as to hold the maximum depth of flow in the gutter to 1½ in. However, this would allow the water to spread out 6 ft. on the outside driving lane. By reducing the depth to 1¼ in., the water would be made to extend on to the expressway 5 feet during 6-in.-per-hr. rains. Depth of water at the probable point of wheel path, 3 ft. out, would be about 0.6 in., which we do not consider objectionable.

Findings Summarized

From Fig. 5 it will be seen that where the road grade is 0.5% the gutter capacity when flowing 1¼ in. deep, would be about 0.32 c.f.s. The efficiency of the inlets for this amount of water on a 0.5% grade is 100% as indicated by curve 2, Fig. 3. The length of pavement producing 0.32 c.f.s. during 6-in.-per-hr. rain is 85 ft. for a 24-ft. width pavement and 55 ft. for a 36-ft. width. Therefore, the spacing of the inlets on a 0.5% grade should be 85 and 55 ft., depending on the width of freeway pavement and median.

On a 2% grade 0.63 c.f.s. is indicated, and the spacing indicated as 167 ft. for 24-ft. pavement and 105 ft. for the 36 ft. width. However, from Fig. 3, Curve 2, it will be seen that we can only hope to entrap 96% of the run-off along a 2% grade. For this reason it will probably be necessary to use more than two of the flares at the low point in the grade, to catch the accumulated water passing the inlets from each side.

Conclusion: It can be concluded from the test run with the model that: (1) the entrance design is satisfactory; (2) that the 1-in. drop in the outside 1 ft. of the gutter in front of the inlet is justified and necessary on account of the increased entrance efficiency produced by this design; and (3) that the efficiency of the inlets, as indicated by the curves in Fig. 3, is proved with reasonable accuracy for the amount of run-off used in the test.

1½-in. Max. Gutter Flow

The indications are, that on a percentage basis the efficiency of the inlets would decrease as the volume

TABLE NO. 1

Without Troughs in Curb and With 1-in. Drop in Outer Foot of Pavement (.5% Grade)

Test No.	% of Grade	Test Time Seconds	Thru Inlets No. 1 Cu. Ft. Per Second	% Efficiency	Thru Inlets No. 2 Cu. Ft. Per Second	% Efficiency	Passed Inlets Cu. Ft. Per Second	Passed Inlets % Passed	Totals Cu. Ft. Per Second
1	0.5	11.2	.212	45.5	.197	42.4	.054	11.6	.465
2	0.5	6.3	.226	45.8	.203	41.2	.062	12.6	.493
3	0.5	6.8	.222	48.6	.184	40.3	.051	11.2	.457
4	0.5	7.0	.206	47.5	.185	42.6	.042	9.7	.434
5	0.5	7.4	.208	49.4	.175	41.6	.037	8.8	.421
Averages				47.4		41.6		10.8	.454

Without Troughs in Curb and With 1-in. Drop in Outer Foot of Pavement (1.0% Grade)

1	1.0	10.3	.172	42.8	.157	39.1	.073	18.2	.402
2	1.0	10.2	.185	43.7	.170	40.2	.068	16.1	.423
3	1.0	10.3	.186	42.1	.174	39.4	.082	18.6	.442
4	1.0	10.9	.173	44.0	.159	40.5	.061	15.5	.393
Averages				43.1		39.8		17.1	.415

Without Troughs in Curb and With 1-in. Drop in Outer Foot of Pavement (1.5% Grade)

1	1.5	6.3	.147	35.7	.165	40.0	.10	24.3	.412
2	1.5	6.4	.163	38.4	.168	39.6	.092	21.7	.424
3	1.5	6.3	.152	39.1	.154	39.6	.084	21.6	.389
4	1.5	6.5	.156	36.7	.161	37.9	.108	25.4	.425
Averages				37.5		39.3		23.25	.412

Without Troughs in Curb and With 1-in. Drop in Outer Foot of Pavement (2.0% Grade)

1	2.0	7.5	.149	32.6	.145	31.7	.162	35.4	.457
2	2.0	6.9	.137	35.6	.120	31.2	.128	33.2	.385
3	2.0	6.5	.144	35.4	.123	30.2	.141	34.6	.407
4	2.0	6.6	.133	30.8	.133	30.8	.166	38.5	.431
Averages				33.6		30.97		35.4	.420

TABLE NO. 2

With 1-in. Drop in Outer Foot of Pavement and with Troughs in Curb (.5% Grade)

Test No.	% of Grade	Test Time Seconds	Thru Inlets No. 1 Cu. Ft. Per Second	% Efficiency	Thru Inlets No. 2 Cu. Ft. Per Second	% Efficiency	Passed Inlets Cu. Ft. Per Second	Passed Inlets % Passed	Totals Cu. Ft. Per Second
1	0.5	10.7	.243	62.3	.147	37.7	....	....	.389
2	0.5	10.7	.246	61.7	.153	38.3	....	....	.398
3	0.5	10.6	.248	64.1	.139	35.9	....	....	.387
4	0.5	10.8	.240	63.5	.138	36.5	....	....	.378
5	0.5	10.4	.239	65.7	.125	34.3	....	....	.364
6	0.5	10.6	.233	65.8	.121	34.2	....	....	.354
Averages				63.85		36.15			.378

With 1-in. Drop in Outer Foot of Pavement and with Troughs in Curb (1.0% Grade)

1	1.0	10.4	.214	54.9	.165	42.3	.011	2.8	.390
2	1.0	10.7	.208	54.7	.162	42.5	.010	2.8	.380
3	1.0	10.5	.194	51.8	.166	44.5	.014	3.7	.374
4	1.0	10.5	.203	54.2	.160	43	.009	2.5	.372
Averages				53.98		43.08		2.95	.379

With 1-in. Drop in Outer Foot of Pavement and with Troughs in Curb (1.5% Grade)

1	1.5	10.6	.184	45.2	.198	48.5	.026	6.3	.408
2	1.5	10.9	.188	47.4	.190	47.8	.019	4.8	.397
3	1.5	10.9	.181	46.1	.193	49.1	.109	4.9	.393
4	1.5	10.6	.187	47.3	.194	48.9	.015	3.8	.396
Averages				46.50		48.57		4.95	.398

With 1-in. Drop in Outer Foot of Pavement and with Troughs in Curb (2% Grade)

1	2.0	10.6	.199	49.2	.190	47.0	.015	3.7	.405
2	2.0	10.8	.196	48.2	.196	48.2	.015	3.6	.407
3	2.0	10.4	.207	49.8	.194	46.8	.014	3.3	.415
4	2.0	11.0	.192	49.1	.185	47.2	.014	3.7	.392
Averages				49.08		47.30		3.58	.405

With 1-in. Drop in Outer Foot of Pavement and with Troughs in Curb (3% Grade)

1	3.0	8.1	.144	46.8	.149	48.1	.016	5.1	.309
2	3.0	10.1	.103	44.4	.111	47.8	.018	7.8	.368
3	3.0	10.0	.141	39.8	.176	49.8	.037	10.4	.354
4	3.0	10.4	.157	43.2	.176	48.3	.031	8.5	.364
Averages				43.55		48.5		7.95	.349

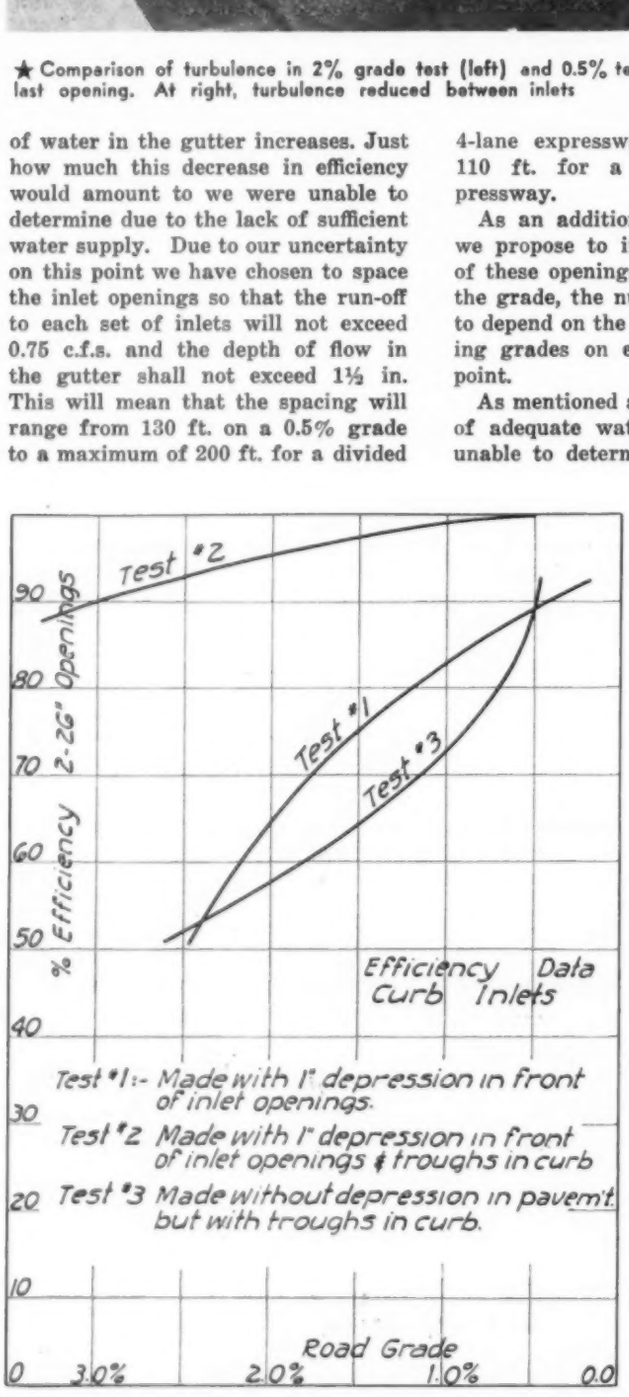
★ Comparison of turbulence in 2% grade test (left) and 0.5% test (right). At left, note turbulence beyond last opening. At right, turbulence reduced between inlets

of water in the gutter increases. Just how much this decrease in efficiency would amount to we were unable to determine due to the lack of sufficient water supply. Due to our uncertainty on this point we have chosen to space the inlet openings so that the run-off to each set of inlets will not exceed 0.75 c.f.s. and the depth of flow in the gutter shall not exceed 1½ in. This will mean that the spacing will range from 130 ft. on a 0.5% grade to a maximum of 200 ft. for a divided 4-lane expressway, and from 75 to 110 ft. for a divided 6-lane expressway.

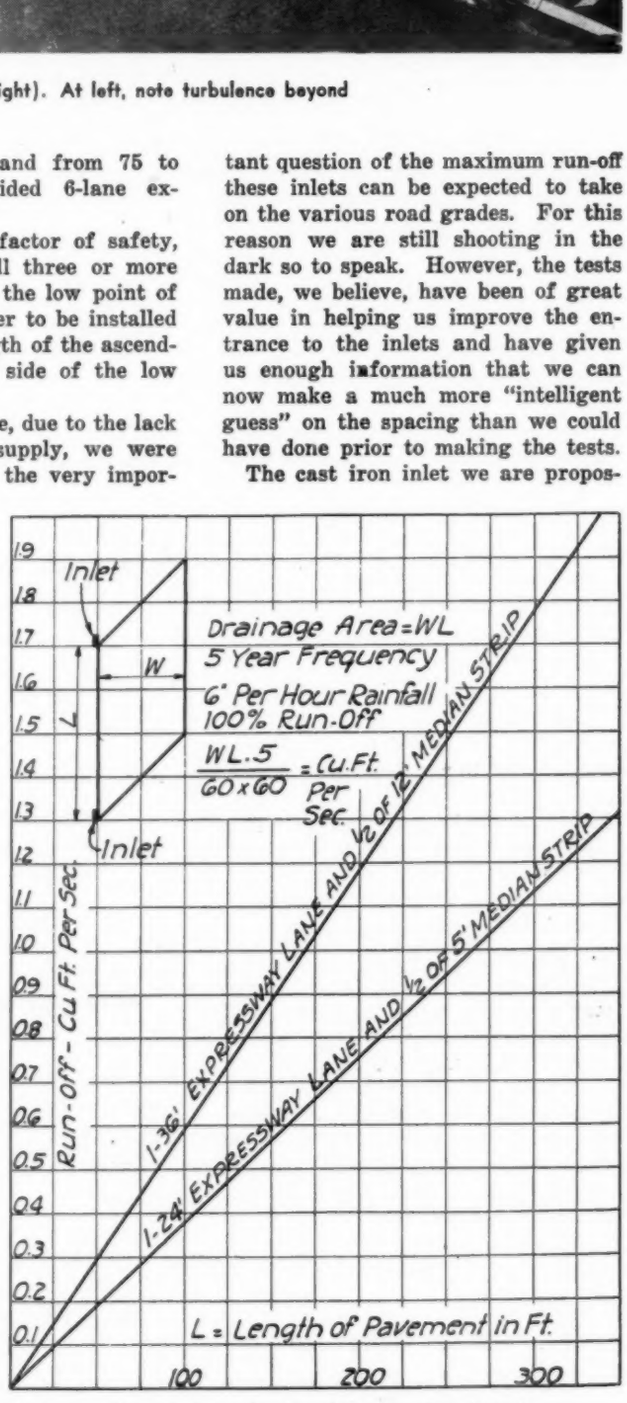
As an additional factor of safety, we propose to install three or more of these openings in the low point of the grade, the number to be installed to depend on the length of the ascending grades on each side of the low point.

As mentioned above, due to the lack of adequate water supply, we were unable to determine the very important question of the maximum run-off these inlets can be expected to take on the various road grades. For this reason we are still shooting in the dark so to speak. However, the tests made, we believe, have been of great value in helping us improve the entrance to the inlets and have given us enough information that we can now make a much more "intelligent guess" on the spacing than we could have done prior to making the tests.

The cast iron inlet we are propos-



★ Fig. 3. Efficiency data on inlets developed in tests



★ Fig. 4. Run-off chart developed for the Fort Worth expressways

ing to use will connect via an 8-in. pipe to the main collecting storm sewers which parallel the expressway on each side. The cost of each cast iron inlet to the contractor will be about $12.00 to $12.50; cost of the 8-in. connecting pipe, about $1.80. Since we plan to use two of the 3 x 26 in. cast iron inlets at each point, the total cost of materials would amount to about $28.60 for each inlet unit. What the cost of installing the inlets will amount to is anybody's guess. However, we are allowing $21.40, or estimating each inlet unit installed at $50.00. This is less than half the cost of the usual catch basin type curb inlet.

We wish to take this opportunity to express our appreciation to George Garrett, District Engineer, District No. 2, of the Texas state highway department, and his entire staff, for the help rendered in the construction and operation of the model.

The experiments described in this report, as well as the compilation of experimental data, and the discussion herein set out, have all been performed under the direction of F. E. Lovett, Urban Designing Engineer of the Fort Worth Expressways.

TABLE NO. 3

Without 1-in. Drop in Outer Foot of Pavement and with Troughs in Curb (.5% Grade)

Test No.	% of Grade	Test Time Seconds	Thru Inlets No. 1 Cu. Ft. Per Second	% Efficiency	Thru Inlets No. 2 Cu. Ft. Per Second	% Efficiency	Passed Inlets Cu. Ft. Per Second	% Passed	Totals Cu. Ft. Per Second
1	0.5	10.5	.185	50.4	.160	43.8	.021	5.8	.366
2	0.5	10.6	.224	42.8	.230	43.92	.069	13.3	.523
3	0.5	10.6	.194	47.8	.178	44.0	.033	8.2	.405
4	0.5	10.5	.212	42.5	.218	43.7	.069	13.8	.499
Averages				45.88		43.85		10.28	.448

Without 1-in. Drop in Outer Foot of Pavement and with Troughs in Curb 1% Grade)

1	1.0	10.8	.193	35.9	.196	36.5	.148	27.6	.537
2	1.0	10.4	.190	36.0	.194	36.8	.143	27.2	.527
3	1.0	10.4	.182	35.2	.190	36.7	.145	28.1	.516
4	1.0	10.8	.187	36.7	.188	37.0	.133	26.2	.509
Averages				35.95		36.75		27.28	.522

Without 1-in. Drop in Outer Foot of Pavement and with Troughs in Curb 1.5% Grade)

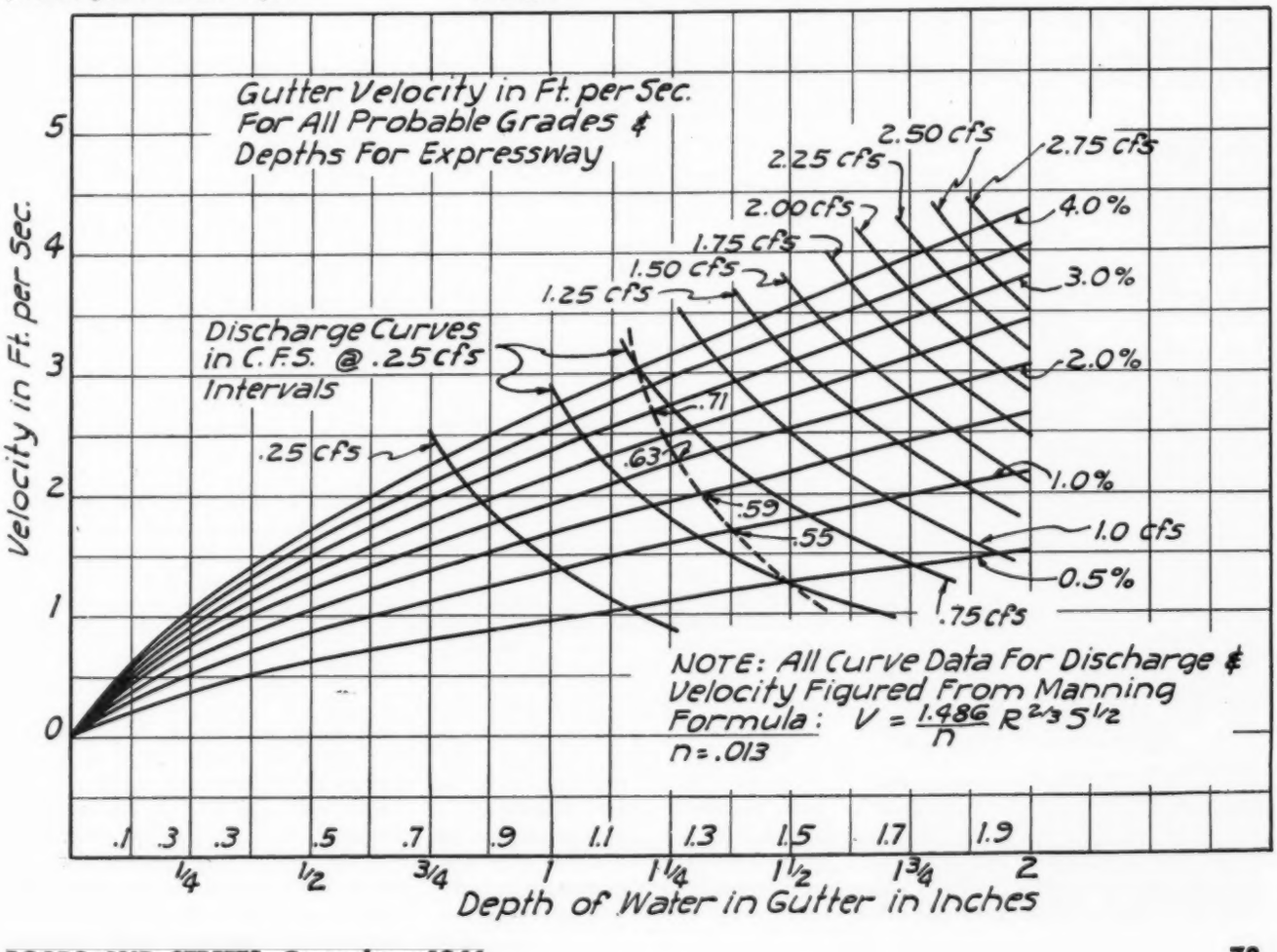
1	1.5	10.7	.181	33.1	.166	30.3	.201	36.6	.548
2	1.5	10.5	.179	34.3	.154	29.6	.188	36.1	.520
3	1.5	10.5	.176	33.6	.160	30.7	.186	35.7	.522
4	1.5	10.6	.174	33.9	.157	30.7	.181	35.4	.513
Averages				33.72		30.32		35.95	.526

Without 1-in. Drop in Outer Foot of Pavement and with Troughs in (Curb 2% Grade)

1	2.0	10.7	.180	34.0	.144	27.2	.205	38.8	.529
2	2.0	10.5	.180	33.6	.145	27.1	.211	39.3	.536
3	2.0	10.4	.183	33.8	.146	27.0	.213	39.2	.542
4	2.0	10.5	.169	33.0	.143	28.0	.200	39.0	.513
Averages				33.60		27.32		39.08	.530

Without 1-in. Drop in Outer Foot of Pavement and with Troughs in Curb (3% Grade)

1	3.0	10.6	.184	34.6	.144	27.0	.204	38.4	.536
2	3.0	10.5	.179	37.0	.139	28.8	.165	34.2	.482
3	3.0	10.4	.177	35.3	.139	27.6	.186	37.1	.502
4	3.0	10.7	.177	35.4	.142	28.5	.180	36.0	.499
5	3.0	10.6	.175	36.1	.141	29.0	.169	34.9	.485
Averages				35.68		28.18		36.12	.500



★ Fig. 5. Gutter velocity in c.f.s. for all probable grades and flow depths

JOB and EQUIPMENT IDEAS

Send in your contributions to this idea exchange and help road building progress. ROADS AND STREETS will pay a minimum of $10.00 each for any publishable field or office methods or shop kinks. Why not pass this along to your staff and encourage them to send in brief "how we did it" descriptions, rough sketches or snapshots.

Chain Saves Rope Changes on Skullcracker

It's a well known and unhappy fact that skull crackers are tough on hoist cable. As we travel about we're always seeing a couple of men fooling with the rope clips at the top of the ball or changing hoist rope, which on a 2,500 lb. ball rope, has had to be changed very frequently, sometimes as often as every three hours.

Rardin Bros., earth moving outfit from Akron, finally tried a length of heavy chain between the end of the hoist rope and the ball, and the result was a very much longer service without cable trouble. The first try was with a single heavy chain, but the final answer proved to be two smaller chains, as shown in the picture on this page. The cable pictured is ½ in. The double chain has greater flexibility to better withstand twisting, which is the cause of all the rope trouble to begin with. Swivel joint devices to prevent twisting apparently don't appeal to these men.

The piece of iron shown here weighs 2,800 lb., and is dropped by a ½-yd. truck crane which this company wouldn't trade for any two other rigs on the Ohio US 40 project which they are grading under Hollinger-Davidson's million-dollar contract this season.

This crane does all the busting and has completely eliminated secondary shooting behind the company's 2-yd. shovel. When any heavy lifting is needed in a hurry, anywhere along the job or in the equipment yard, the operator lowers the boom to "over-the-road" position and shinnies to the spot, as shown by the other scene taken while the crane was delivering tractor tracks to Rardin's track press machine on the project.

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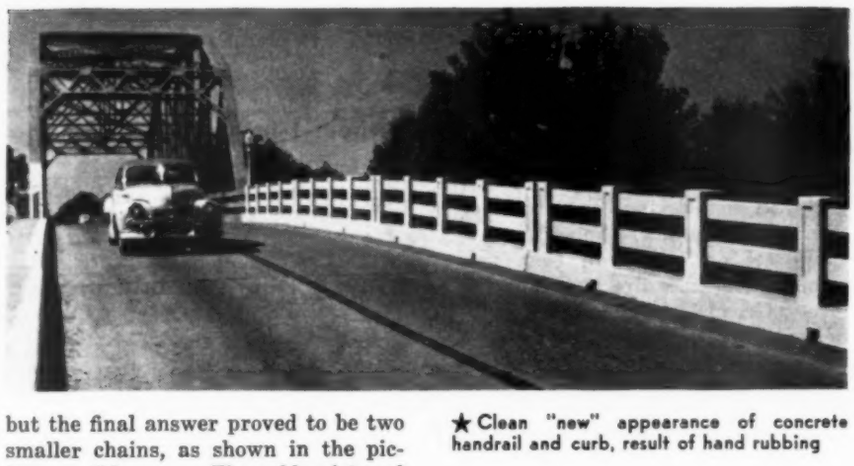
A trans-Africa road has been proposed across the heart of equatorial Africa. This 3,000-mile projected route, according to a news dispatch, would involve many years of Herculean labor and involve crossings of the Niger and other large tropical rivers, as well as clearing of jungle in areas of heavy rain. One route considered would begin at Lagos, in British West Africa, and terminate in the British east coast colony of Kenya, traversing French Equatorial Africa and the Belgian Congo.



★ Clean "new" appearance of concrete handrail and curb, result of hand rubbing

Why Paint Concrete Rail and Curb?

The glistening "new" concrete handrail and curb pictured here is not new at all, nor is it a whitewash or paint job. The effect comes from ordinary hand rubbing with a rubbing brick, water and elbow grease. Rubbing was substituted for this and other older dingy looking concrete on bridge approaches this past year in the Yoakum district of the Texas highway department. According to district engineer Mack Hodges the substitution saved paint, which wasn't always available anyway, and saved money. More important, in his opinion, it resulted in a better looking effect, the concrete work having a strictly new appearance rather than that of whitewashed masonry which Mr. Hodges puts high on his "don't like" list.

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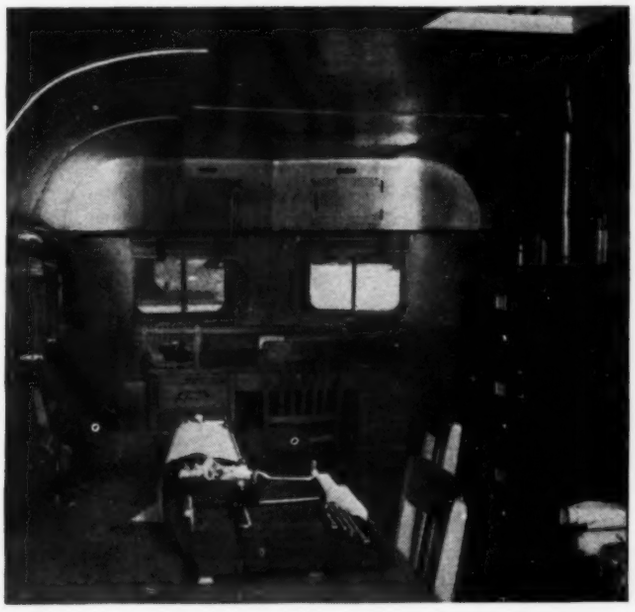

Trailer Field Offices

The Nello L. Teer Co. of Durham, N. C., is making extensive use of house-type trailers for field offices. As is shown in the accompanying photographs, these units are completely mobile while providing compact and efficient working space. It is believed that the improved working conditions are self-evident and should make the use of this trailer office increasingly popular.

The well lighted and ventilated trailer pictured here was used on The Shirley Mason Highway grading job, described in April "Roads and Streets." Looking toward the front of the field office, the entrance is on the right. Plan file, stenographer's desk, and work table are seen. Looking toward the rear, another desk and a file cabinet are visible. Stove pipe of heating unit is seen back of file cabinet. Rear door is back of stove and roof ventilator is above file cabinet. Note ample lighting fixtures and venetian blind fitted windows.

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Road Paving Forms Save Lumber on Small Concrete Culverts

Two and sometimes three tiers of steel paving forms were used as the outer sidewall forms on a string of small culverts by an Ohio contractor, Hinton Construction Co. A sample of their scheme is pictured here. Ordinary form pins hold the forms together, and with usual bracing that's all there was to the trick. Saved scarce lumber for the contractor, who is mainly a paving firm, we understand, and has usually subbed small structures on general road contracts.

Pumps and Mixer Bureaus Report Production Gains

The Contractors' Pump Bureau and the Mixer Manufacturers' Bureau, both affiliated with the Associated General Contractors of America, reported production increases at annual meetings held at the Homestead Hotel, Hot Springs, Va., early in November.

Self-priming centrifugal pump manufacturers reported that they had already established a peacetime production record in 1946. They reported that unfilled orders for the pumps were realistic, and that "watered" orders did not exist on their books primarily because these pumps had been produced continuously throughout the war, and some shipments were made to construction equipment distributors without interruption.

In their annual meeting on Nov. 4, the pump manufacturers reported that production had increased several times above prewar levels. The heavy demand from the armed services required expanded production facilities, which are now at work turning out pumps.

A. S. Marlow, Sr., president, Marlow Pumps, Ridgewood, N. J., was elected chairman of the Contractors' Pump Bureau for 1947. He succeeds John H. Hase, C. H. & E. Manufacturing Co., Milwaukee, Wis.

Members of the Mixer Manufacturers' Bureau, in their annual convention on Nov. 6, reported greatly improved production and shipments, an outlook for expanded sales, and a confidence in their ability to meet demands.

Julien R. Steelman, Koehring Co., Milwaukee, Wis., was elected chairman of the Bureau for 1947 to succeed G. K. Viall, Chain Belt Co.

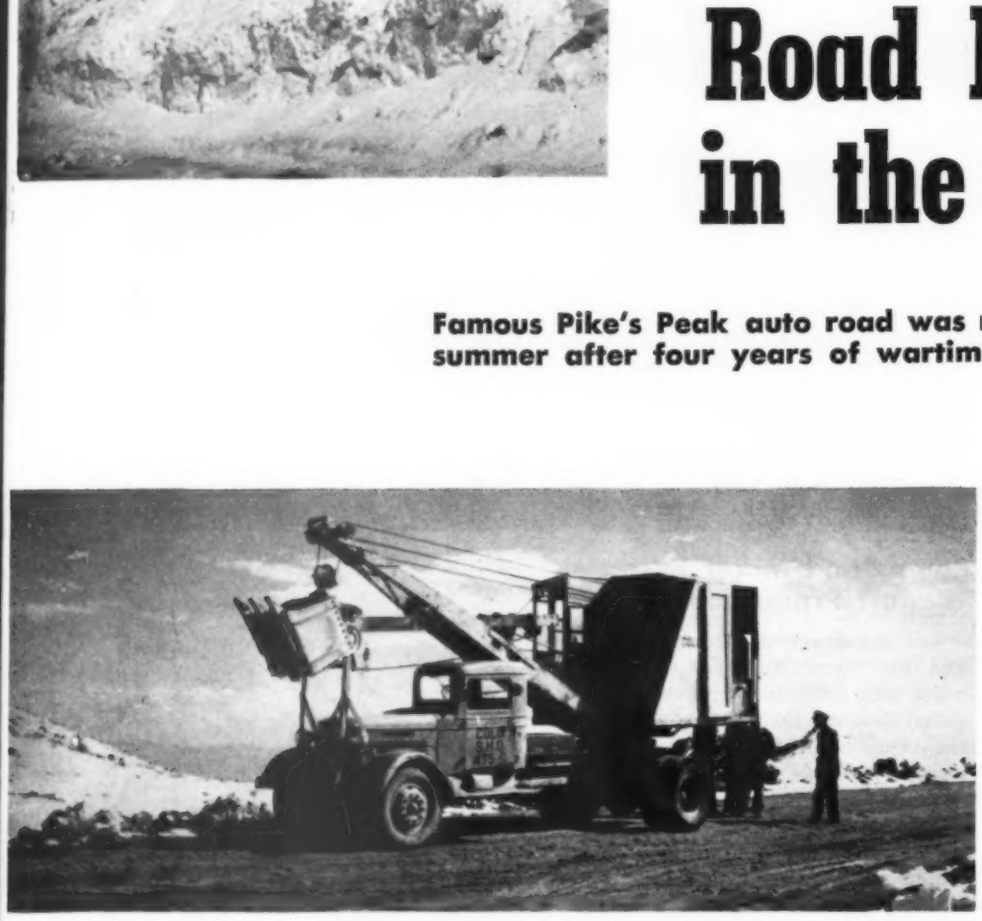
•

Did you realize that the highway construction industry has one of the highest employe accident rates of any industry? Safety training of workers and particularly of foremen and superintendents, through contractor group meetings and on-the-job campaigns, will pay dividends in 1947 and in any year.

★ As with gravel or stone road repairs 'most everywhere, a motor grader was the equipment mainstay. Elevation here, 12,500 ft. above sea level

Road Repairs in the Clouds

Famous Pike's Peak auto road was restored last summer after four years of wartime shut-down



ALL last May and early June out in Colorado a repair crew tusseled with an assignment that proved to be a test of both men and machines. The 18-mile gravel and stone motor road up Pike's Peak had been closed in its upper limits throughout the war, and repairs were being rushed to get the road ready for summer thrill seekers.

The road has had an interesting history. It was built about twenty-five years ago as a toll road by Spencer Penrose, Colorado capitalist, and taken over by the state after the franchise expired. Maintenance is paid from receipts of gasoline tax funds accruing to state highways on a mileage basis and 30% gasoline tax funds accruing to El Paso County.

In case you have never been one to attempt it with your car, here's a brief word of description. The road begins at about elevation 7,000 and consists of shelf and valley and more

★ At El. 12,500 a truck crane is getting ready to hunt for thawed gravel, for regraveling washed sections immediately below

★ This one-way plow with four-wheel-drive truck cleared lighter drifts and falls that occurred in the night, usually working diagonally across the road shelf because of the steep grade

shelf location, often of a spectacular nature, finally winding and zigzagging to the summit at elevation 14,109 ft. Its lower reaches are to a relatively higher standard, usually under 10% in grade. Minimum two-lane width, barely 16 or 18 ft. including shoulders, is encountered more and more frequently as the road ascends, and in the upper reaches grades of 14% and sharp hairpin turns necessitate second if not low gear for the tourist's jalopy, not to mention copious steaming of the radiator in this rarified air where water boils at 180 or 190 degrees F.

While the Peak never has the great snow blanket of Mt. Ranier and other peaks nearer the Pacific, it has enough snow to require a sturdy plowing outfit every spring. Last season the snow was unusually light, which aided repairs. But still it was necessary to work through completely blocked stretches hundreds or thousands of feet in length with a tractor and one-way plow.

Most of the damage naturally occured at higher altitudes, the damage at lower levels being that normal to any hill road of granular material washed for a period by rain and melting snows. Steady reshaping and blading with a pull-type grader behind a four-wheel-drive truck was the principal operation.

In the upper end, however, both rock falls and washouts were encountered, necessitating the use of a truck-mounted shovel. The shovel climbed up and made progress on some of the worst spots late in 1945, and then again last spring it worked progressively upward as thawing permitted removal of material and opening up of borrow pits of loose rock.

Much of the damage to the roadway was caused by the fact that culverts thaw out slowly above timber line. During the daytime thaws of spring and early summer, water runs in rivulets or small torrents across or along the road shelf, often quickly washing deep fissures. Every effort was made to clear culvert approaches and inlets and open up ditch lines, and ice accumulation at culvert outlets was removed by hand chopping, and poking with an iron bar. A steam thawing outfit would have been handy, but none was employed.

★ A pull grader outfit worked the lower reaches, where the grades were usually under 8%

The Peak road repair job has been very hard on equipment. Equipment in use in early June included:

1 heavy tractor, one-way plow
1 truck-mounted ⅜ yd. shovel
1 heavy motor grader
1 four-wheel drive, 5-ton truck with one-way 12-ft. blade
1 bulldozer
1 dump truck, state-owned
Several hired trucks

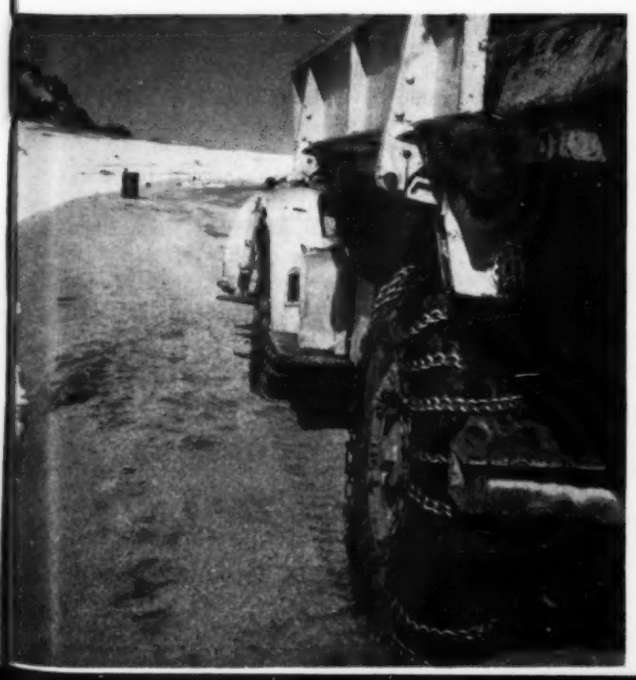
Operators spent much of the working time creeping miles in low gear to the point of the day's work, only to have to quit after a few hours and descend to a safe over-night storage base, again using low gear and giving brakes a tough workout. Transmissions and brakes have taken a real beating in a few weeks, according to Charles Shumate, assistant maintenance engineer of the state highway department, in charge of the project. Carburetors are reset from time to time to adjust air intake for changes in altitude.

★ A tractor plow opened up drifts in the higher reaches

Plowing uphill when the grade is 14% is a tedious job, and the task of

(*Continued on page* 90)

★ (Left): Chains were a must on Pike's Peak work. (Right): Up, up, up goes the 14% grade above timber line. Corrugated culverts had to be thawed to open. Melting snow badly eroded the surface and required repeated blading as thawing progressed



"Examine the Horse before Buying"

A plea for careful analysis of the site before bidding. Reprinted with permission from "Nerba," these personal observations do not necessarily reflect the policy of the Connecticut state department of highways

By E. T. Nettleton
Engineer of Contracts, State Department of Highways of Connecticut, Hartford

MOST specifications have a clause which distinctly states that "the prospective bidder is required to visit the site of the project and ascertain to his own satisfaction the conditions under which the work will be performed, and that no plea of misunderstanding will be considered because of his ignorance or failure to be aware of the conditions."

It is not always possible for the bidder to visit the site of the work at such times as are quite parallel or applicable to the exact time of year that the work will be in progress. On the other hand, a certain amount of judicious inquiring from certain government, state, city and town officials, old residents, farmers, long shore men, and others will usually satisfy one as to those conditions which will probably exist while the work is actually under construction. In many cases the plans, specifications, special provisions and boring data may also render valuable information. Perhaps in some cases it may be wise for the contractor to make a few preliminary ground tests himself.

The chief field conditions to be considered in an inspection of the site of the project are such factors as surface conditions, sub-surface conditions, unloading locations, storage yard and plant set up locations, hauling conditions to the job, sources of materials, such features as may place limitations upon working hours, and safety factors. **Surface conditions to be observed on the site of the work are the following:**

1. All structures, such as buildings, barns, foundations, bridges and retaining walls, which may be demolished or moved. Consideration should be given to any possible salvage value.
2. The number, size, and kind of trees to be cut, trimmed or protected.
3. The number of elm-wood trees which will have to be burned.
4. The area, character, and density of all brush areas which will have to be cut and burned.
5. The area and depth of top soil or loam to be removed.
6. The location for stock piling of loam.
7. A listing of all mail boxes and fencing to be re-located.
8. A listing of all temporary fencing required during construction.

Sub-surface conditions to be observed on the site of the work are as follows:

1. The type of earth excavation; such as, loam, sand, sand-clay or clay.
2. The kind of rock to be excavated, as well as the character of the seams and natural faults in the rock.
3. Examination of the boring samples and location of the bore holes.
4. The ground water level and the possible effect that tidewater, freshets, and season of the year may have on the ground water.
5. The location for all proposed drainage pipes, footings, and foundations, which may need sheeting, shoring, cofferdams or pumping.
6. The necessity for installation of any temporary drainage pipes to facilitate job operations or to accommodate traffic.

Facilities and conditions to be observed at possible sites for unloading of materials and equipment:

Railroad Locations

1. The length, capacity, and condition of the siding.
2. The use of the siding by others.
3. The number of switches per day and the time of switching.
4. Existing trestles, unloading pits, or chutes.
5. The existence of any telegraph, power or other wires, which might prevent crane operations.
6. The existence of any stationary cranes, which might be available for unloading of heavy equipment or structural steel.
7. The existence of any platforms, sheds, or other buildings, which may be used for unloading or storage.

Water Locations

1. The length, capacity, and condition of the dock.
2. The channel depths which effect size of barges and boats.
3. The amount of protection against storm and the tide conditions.
4. Harbor rules, bridges, and other features, which might handicap delivery.

Observation of existing conditions as to their possible use for storage yards and batching plants:

In making the final decision as to the most economical place or places for such set ups one must take into consideration the feasibility of locating at the following points: on the site of the work, at the place of rail or water delivery, or at the source of material. The choice will be based on comparative consideration of the following factors:

1. Size of space available and the rental charges.
2. The use of existing ramps, pits, trestles, barns and sheds.
3. Availability of power and water.
4. Possible locations for dynamite sheds, gas tanks and oil tanks.
5. Freedom from injunction proceedings, traffic problems and other interference.
6. Hauling conditions around the yard.
7. Hauling conditions as discussed under the next heading.

Hauling conditions to be observed both on and off the job:

1. Distance of hauling.
2. Type of surfaces and grades to be hauled over.
3. Width of roads and traffic conditions.
4. Maximum load allowed on the roads and bridges.
5. The necessity for strengthening or shoring of bridges.
6. Interference to normal flow of traffic by railroad crossings, lift and swing bridges, stop lights, and other factors.

Sources of local material to be examined:

The location, ability to furnish materials, and the quality of the material furnished by commercial producers are usually known in advance. Local material and local deposits, either on or off the job, will have to be located and examined for the following factors:

1. Quality of the material.
2. Quantity of the material.
3. The need for any necessary processing of the material.

4. Royalty or purchasing price of the material.

5. The necessity of stripping the local bank.

6. The need for construction of roadway into the aggregate bank.

7. The length, condition, and grades for hauling the material from the bank to the job.

8. The condition in which the bank must be left as required by the owner.

Various conditions to be observed which may limit working hours:

1. The time of year as it affects daylight operations.

2. Auto, truck, trolley, or railroad traffic.

3. Delays, caused by neighboring contracts.

4. Limitations on the amount of blasting or pile driving.

5. Limitations regarding the burning of brush.

6. Limitations regarding noise before or after certain hours.

7. Limitations caused by water, storms, tides and currents.

8. Limitations of the local ordinances as to Sunday and holiday work.

Various conditions involving public safety:

1. The necessary shoring of adjacent structures.

2. The necessity of fencing for animals.

3. The necessity of barricades and lights.

4. The necessity of flagman, or policemen, for traffic control.

5. The necessity of flagman for railroad crossings.

6. The possibility of detours.

7. The possibility of closing a road to public traffic.

All of the factors which have been listed will not appear in any one project, but the bidder should check on these major elements to be sure he has not omitted the consideration of any essential obstacle which might cause delay, difficulty or expense to the contractor. Ample time and effort spent in analyzing the field and working conditions on the proposed site of the project before working up the bid will aid the contractor in making an intelligent estimate and will assure the efficient prosecution of the work.

Note: Any opinions expressed in the above article are those of the author and do not necessarily reflect the views of the Connecticut State Highway Department or of the publication "Nerba."

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Federal Automotive Taxes—Automotive and highway user taxes collected by U. S. government in October, 1946, totaled $143,790,509 as compared to $116,576,644 in October, 1945. Gasoline taxes last October were $39,237,189.

Traffic Lights for Construction Equipment

We've seen two examples recently where stop-and-go lights performed a vital safety service in keeping earthmoving equipment from tangling with fast moving traffic.

One was on U.S. 80 between Fort Worth and Dallas. This is the main highway between these adjacent cities, and it carries around ten thousand vehicles daily. This past summer two miles of U.S. 80 was regraded parallel to the present pavement, in order to raise the road level several feet across a creek overflow area. Self-powered scrapers had to cross the existing pavement to and from a borrow pit, making hundreds of such crossings daily.

Naturally something had to be done, so the contractor and the state cooperated with a light, which was operated by a man stationed full time at the crossing. A simple red-white system was worked by a manually operated switch mounted at the base of the pole (see upper photo). By routing scrapers in groups whenever possible, the number of stoppages of traffic was cut to a minimum.

The other example of a contractor-operated signal was used in Los Angeles, on the Santa Ana Parkway grading job of Peter Kiewit and Sons Co. (See lower photo.) The new parkway axis crosses an extremely heavily traveled arterial, at the point of an eventual grade separation. Without waiting for the structure it was necessary to move a large volume of scraper dirt across the arterial. Here again, a light was the answer, the light in this instance being suspended over the center of the street and operated from a wooden tower mounted on high ground to one side.

★ Contractor's equipment getting the green light across busy US 80 near Ft. Worth

★ Light and control tower erected on Santa Ana Parkway, Los Angeles. Peter Kiewit & Sons Co. contract

1947 Profits Will Be a Matter of Timing

The author of this article is the superintendent for a prominent firm of excavating contractors, specializing in finishing ballast for railroads and aggregate for highways

WHEN all the heavy construction work, the ARBA program, and other pent-up projects really get under way (probably during 1947) it will again be a matter of hurry—hurry—hurry—reminiscent of the war years. But with the appalling difference of increased taxes (over 1941); higher labor and material costs, new men to train, continued governmental restrictions, and the possibility of still existing shortages in some items of equipment. Such a situation will demand every ounce of operating efficiency. Indeed it is on the measure of skillful operation applied that duration in business depends.

An analysis of correct timing and a study of co-ordination on the over-all job will not only greatly increase efficiency but prove a decided factor in giving added equipment life necessary to stay in business.

In furnishing ballast for railroad work, our job is digging the material, transporting it to our mills, and delivering it in proper grades to the user. Each step in the operation ties in. Each step of the operation depends on the other.

For efficient and safe digging we must know the exact condition of our machines and equipment. If we are to use our machines efficiently, we must know when these machines in their present condition, reach their load limits. You may say, "But that is all a matter of record. Every manufacturer tells you that." True, but only for equipment with new guarantees or factory rebuilding jobs. We must keep in mind that we will have to deliver more work than ever before, and much of it with machines that have seen years of service. For example, today we are using sections of wire rope which were retired, brought back into service, retired again, and then cut and spliced for a third use. If wire rope continues to be scarce (which well it may) this war-time lesson will be continued.

Determining the safe average load and the maximum possible over-load for this equipment is another matter. And we all know that regardless of rules, every shovel employed in excavating is required to deliver over-loads.

If the slag pile or floor has not been properly pre-worked for the shovel, break-downs and lay-ups are bound to result. Each repair job leaves the equipment subject to new and different stress.

Attention to Floor

More attention to the floor will show in longer life for the machines, and more work delivered. Before the war we were able to take chances in removing with the shovel large pieces of floor even if we did over-load. During the war and even today we cannot take these chances. I think it was false economy then.

All excavator owners are agreed that the floor must be properly prepared for efficient operation all down the line. The big difference of opinion comes as to how much of this work should be placed on the shovel. Considering present equipment condition, and the absolute need for making what we have last, there can be but one answer.

It has been my experience, based on many years of operation, that overloading or forcing a shovel was a time-losing proposition, and that operation cost was reduced and production greatly increased by more emphasis on floor conditioning. By holding to an absolutely safe minimum, we are finding that we are getting longer lasting equipment, more ballast per work hour, and better job timing.

Timing All-Important

Constantly behind this fundamental is unceasing attention to machinery maintenance. Rope study, for instance, and the application of simple common sense ideas to operation is an every day rule. We have learned that often switching ends on cables, placing the worn end at the drum where there is less stress, is a simple practice which gives us added life.

We have learned that for our use, preformed rope gives us twice the life that ordinary rope construction formerly gave us. In switching ends, in cutting cables, in fact, in all general rope maintenance, we have learned that the use of preformed results in far less rope footage loss.

When a number of shovels are in operation on the same location, all delivering material to trucks (in our case five shovels feeding a fleet of trucks which make a belt-transport to our mill), proper timing is a big job factor. A load coordination can be worked out which will not only do away with peak over-loads for shovels, but result in each shovel unit producing evenly. It takes no great amount of experience to see that here, correct timing is a decided step in the right direction, and is bound to produce longer service life for all equipment.

Shovels, for example, are constructed for steady work. The timing of transportation sets the pace for each shovel unit and for the work as a whole. Regardless of instructions and rules, if trucks are allowed to group, then shovels will be over-taxed, and productive time is lost. There will be spurts of stepped-up operation followed by equally idle periods.

More Job Analysis

A uniform timing between trucks and shovels can be accomplished with a little job study. Results in better operation are worth the effort.

In a study of equipment, condition of floor and material to be removed, and the overall operation, the need for a few highly trained key men is one of the first findings.

Highly trained key men is a "must" if equipment is to be used properly and protected. This statement is so well known that to rephrase it sounds trite. Highly trained key men means more than two or three good operations. It means an organization of first class machine operators, fleet operators, floor men, and mill engineers. All men working as unit with no single outstanding operator. That's teamwork.

We all are having experience with green help. This cannot be avoided. But as soon as a new man shows aptitude for a particular job, he should be given the job and some "old head" assigned to give him special training. There is no substitute for a well trained machine operator. This goes whether it is the shovel on the slag pile or a drag line loading ballast from the mill into railroad cars for final delivery. The man who knows his business here will produce more work and save thousands of dollars

in equipment costs. Especial care should be given returned soldiers. Just because some man ran a shovel on the Burma Road doesn't necessarily make him a good shovel runner. In service he got new machines or parts by signing a requisition. We have to sign a check.

Returned G.I.'s

Some of this returned-army-personnel training is going to be difficult. Perhaps the M.I.T. graduate went directly into service, joining the engineers or the Seabees. Perhaps he came out a Captain or a Major, and now that he is in civies again he wants a top job at top pay. But his two silver bars in the Army don't necessarily mean that he is entitled to the same rank in our organization. We know he gained his experience in the war-imposed slam-bang, crush-or-be-crushed school. Many of these men have to be un-trained, then re-trained. That's a tough assignment for some of us "supers" but we have to do it.

Some of us old timers who served in World War I know that if there is any one thing that is completely lacking in military life it is timing. (And for those who have seen service —"that's a joke, son.") So, here again is necessary training for all new faces, regardless of where they come from. Timing—yes, timing alone—can spell the difference between profit and loss.

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(*Continued from page* 67)

were the same as described for lanes 1 and 2. The roll of top material previously left near 3 was bladed on across 3 and 4 during tight blading, and left near lane 5. The procedure was repeated in succeeding pairs of lanes, the roll being finally wasted on the far shoulder.

Wastage of this small roll was considered an important detail by the engineers on this project. This material was regarded as being something less than good soil-cement because it had been repeatedly wetted, manipulated and dried during the operation and its cement content thus possibly leached out or hydrated.

The curing cover, applied to prevent evaporation losses in the newly compacted work, consisted of .3 gal. of emulsified asphalt. All pavement will be covered with a triple bituminous penetration topping totaling about ¾ in. thickness.

Control Procedure

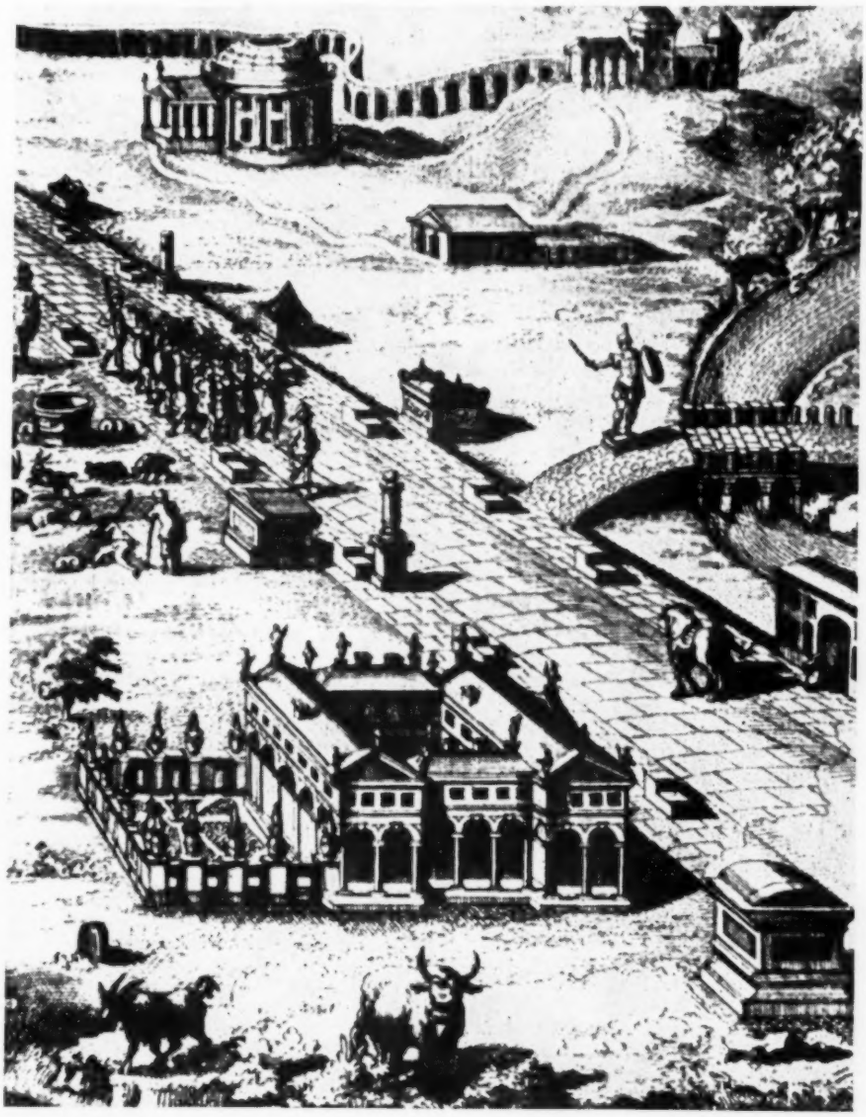
Control procedures here were typical for such projects. For each day's work the field inspector took raw soil moisture samples to determine water percentage to be added to the soil-cement mixture. Frequent moisture checks were made to see that proper moisture was being added. Density tests were run less frequently, averaging two or three per lane. In-place densities were required to be not less than 5 lb. below standard moisture-density test. A standard moisture-density test was run against every density test, as a means of protecting the contractor.

Soil-cement processing began Sept. 2. Only about 3,000 sq. yd. per day was completed at first, but toward the last, several days' runs exceeded 8,000 sq. yd. in an 8½-hr. day. The job was processed in 20 working days, and finished well within the same month thanks to good weather.

While this is no speed record, it is a good performance, considering that only eighteen men were needed to run the job. These consisted of 2 men at the cement cars, 4 cement truck drivers, 3 on the cement spreader box, 1 on the stabilizer, 1 oiler, 1 blade man, 1 sheepsfoot man, 1 man on the nail drag, 1 sprinkler operator, 1 mechanic, 1 foreman and 1 superintendent.

In Days of Old

Roads and Roadbuilding in Years Gone by



★ Roman Road during the teime of the Empire. The pavement is clearly visible in this old illustration

Check Dams Successful in Connecticut

MARKED success has attended efforts of the Connecticut State highway division of highway drainage to control erosion, occasioned by the rapid discharge and flow of water from various highway drainage culverts widely located throughout the state. The control has been effected by the use of check dams the first series of which were installed approximately five years ago. Continued installation has, in every case, overcome the deepening of ditches and the caving of banks.

The dams are constructed of salvaged bridge planking measuring about 3 in. by 5 in. Narrow trenches are excavated transversely across the flow line to a depth of about 3 ft. The dams are set into these excavations and extend into the adjacent banks to a depth of 5 or 6 ft. After the dams are erected and stabilized the trenches are backfilled with sod, thoroughly tamped. The number of dams used in any one ditch is determined by the extent and length of the erosion.

The elevation of the tops of the spillways are based on the outlet flow line of the culverts. The first dam in a series is erected with a spillway elevation the same as that of the culvert outlet. The distance from the culvert to the first dam is such that the vertical drop is about 2½ ft. The second dam is set with a spillway elevation equal to the elevation of the base of the first dam, i.e., 2½ ft. lower. The distance between dams is governed by the steepness of the slopes.

In addition to retarding the rate of flow of the culvert discharge, the dams compel the sediment, which is carried in suspension, to be released and deposited in the pocketed areas above each dam. The eventual filling of the pockets to the approximate elevation of the spillways is thereby assured.

No installations are made without the consent of the property owner upon whose land the erosion has taken place. In case of disagreement between the department and the owner, the offices of the County Farm agent and the U. S. Department of Agriculture often bring about a satisfactory settlement of the case. County Soil Erosion Districts are being formed throughout the state, under an act passed by the 1945 General Assembly.

District sessions have been attended by highway department engineers who have explained phases of erosion control as related to highway slopes and culvert outlets. Continued efforts along these lines should bring erosion from these sources under complete control in Connecticut.

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Highway Traffic Setting New Record—Total highway travel in 1946 as gauged by gasoline consumption is exceeding that in 1941. Data for the first six months of this year show that in each month gasoline consumption surpassed that in 1941. It is logical to conclude that urban travel is setting a new record in 1946.

★ Showing typical stepping arrangement of several dams

★ Details of dams, made from discarded bridge timbers

SAFETY

IS THE WATCH WORD ON THE DELAWARE RIVER BRIDGE . . .

Pat. No. 2,280,276
April 21, 1942.

WHERE THIS FLASHING WARNING LIGHT PLAYS ITS PART

▶Every step has been taken to make travel safe on the Delaware River Bridge. The Bridge Commission long ago gave up depending solely on head and tail lights on their equipment. They know that without special warning lights snow plows, work trucks, patrol cars, etc—operating at either very slow or high speeds or parked on the bridge—become highway hazards.

To cut down accidents—protect lives—the Bridge Commission has installed Keystone Safety Flasher on practically every piece of equipment. This light flashes 80 storm piercing "STOP" warnings per minute—to front and rear. Can be seen in all-weather. Completely visible through swirling snow. Acts as a "lighthouse" to promote highway safety.

Used successfully for 10 years by highway departments of Maine, Pennsylvania, Illinois, New Jersey to name a few; and by countless cities, counties, towns, park and bridge commissions, public utilities, etc. Write us to send you a light for two weeks inspection, using your official stationery. Auto Gear & Parts Co., 16th St. & Hunting Park Ave., Philadelphia 40, Pa.

This vibration and weatherproof light is supplied with 6½" red lenses, lettered "STOP" or with plain red, amber or blue lenses, for 6 or 12 volt systems.

The "Lighthouse of the Highway"

KEYSTONE FLASHER LIGHT

We Get About What We Pay For

By Ben H. Petty
Professor of Highway Engineering
Purdue University
Lafayette, Ind.

WITH me, as with many other public speakers, the title of a speech is like a fence gate—we use it to get in and after we are in we proceed to forget all about it. However, the subject of this discourse is certainly pertinent to highway improvement and I hope I can "swing on it" frequently as I go along.

A speaker who comes to you as an "unknown" should first establish his qualifications. Tonight, I intend doing this by quoting from an editorial in an Indiana newspaper of the vintage of 1934.

You will recall that back in the early "thirties" we out here in the hinterlands were bombarded with propaganda about the galaxy of "brain-trusters" that had been assembled down in Washington, D. C., to plan a more abundant life for all of us in the U. S. A.

Permit me to show proof that I, too, qualified as one of the first, if not the first, brain-truster in that great Hoosier State of Indiana.

The following quotation is from an editorial in the Monticello Herald, Monticello, Ind., Aug. 9, 1934:

"Road Question Is Hot"

"The White county road question must be getting 'hot' and causing the officials in charge of the roads considerable worry since the county auditor, commissioners and county road superintendent imported a Purdue College professor into White county last week to attempt to vindicate the expenditure of about $100,000 per year on the White county roads.

"The first White county 'brain trust' set up consists of Professor Ben H. Petty of Purdue University who appeared at the court house in Monticello and made a speech Thursday night after making a tour of the 932 miles of county roads Thursday afternoon. This was followed by a speech before the Monticello Luncheon Club Friday noon in which Mr. Petty made a most feeble effort to 'whitewash' the spending of almost $100,000 on White county roads in 1933 in addition to all the C.W.A. work and other relief work done on the roads in the county.

"Mr. Petty dwelt on the fact that the county highway system consists of 932 miles and if stretched end to end would extend from Monticello to Boston, Mass., and that the sum of 30 cents per mile was available to be spent on each mile of road each day.

"The thing that Mr. Petty did not mention was the percentage of traveling done in White county on roads which were paved and are maintained by the state. White county's 85 miles of state roads carry a large portion of the traffic. If the county officials in charge of the finances of the county had made arrangement to pay the state the $15,000 which we owe them for right-of-way in the spring of 1932 instead of in Demember, 1932, the Buffalo pike would have been taken over by the state and White county would have been relieved of this expense the past two years. As it is the road is still being maintained by White county and probably will for the next year remain on our hands for maintenance. The Buffalo pike is by far the most expensive road to maintain in the county."

Now right about here is an excellent opening for that title, "We Get About What We Pay For." Apparently this county newspaper editor had become so completely "buffaloed" by that Buffalo Pike that he missed entirely the significance of the data quoted in the third paragraph of his editorial tirade. When only 30 cents a mile a day is provided for *both* maintenance and improvement of a system of roads, we can expect not super-highways, not state highways, not even good county highways—but merely "30-cent" roads.

Too many citizens look at the total annual expenditure on a system of roads, are shocked thereby, and stop right there. That $100,000 looks like a lot of money, or did B.N.D. (Before New Deal), but also 932 miles of road looks like, and is, a lot of road. But when you divide that $100,000 by 932 and again by 300 (working days per year), and get 30 cents a mile a day, it loses practically all of its awesomeness.

Try this simple mathematics on your own county road expenditures and utilize the results to set some of your critics straight. It works equally well on state roads.

State vs. Local Roads

In commenting on other phases of this editorial, let's just skip over the "amazing" contributions of C.W.A. and other relief agencies to county road improvement. And let's get straight on the relative contributions of state roads and county roads to the general welfare of the average county.

So many people never seem to understand the difference between the functions of state roads and the functions of county and township roads. Suppose we compare our combined road network to a tree. If we strip off all the branches (county and township roads) we have only the strong sturdy trunk (state roads) left to die from lack of "feeder" nourishment. Likewise, without the trunk the branches would be of little use because they would lead nowhere and have nothing to support them.

We need both systems! The state roads to tie our cities together and to concentrate and carry the voluminous, heavy, and destructive traffic which otherwise would spread out and destroy our weaker "local" roads in a short time. The county and township roads to serve the rural communities, the hundreds of thousands of farms, to make possible consolidated rural schools, to get the spuds, wheat, corn, milk, fruit, and the makings of those delicious pork chops and porterhouse steaks to town so you and I and all the other city dwellers would not starve to death. Of course, the "local" roads are not race tracks, as are most of our state roads, but their existence in year-round usable condition is just as vital to our daily life as are the state roads. They are *all our* roads, and let's stop drawing such fine distinctions between them!

In the average county seat town, the merchants, professional men, and newspaper publishers would soon be hanging crepe (business dead) on their store and office doors if, by waving a magic wand, every mile of county and township road could be made to vanish permanently.

Living Within Our Means

Let me emphasize the title of this discourse by a very simple illustration. Before the "bulge" in prices,

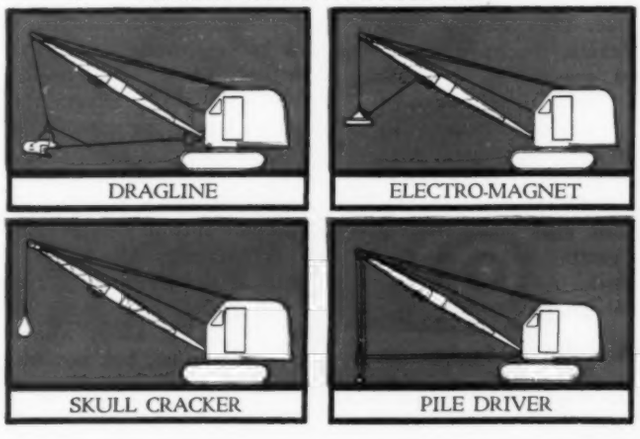
Banquet talk at recent Annual Meeting, Northern Michigan Road Commissioners' Association, Manistee, Mich.

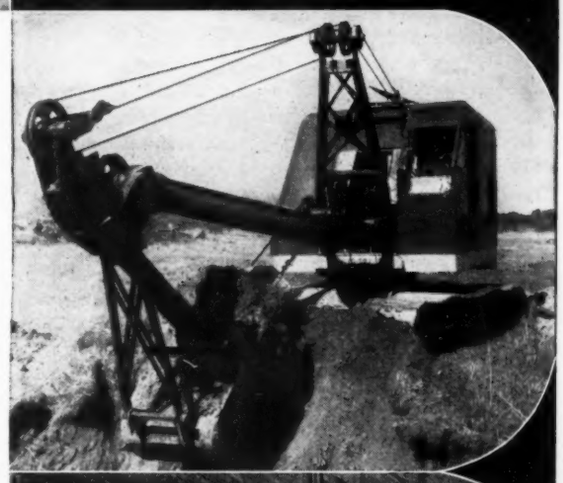
Get the Facts on BUCKEYE SHOVELS

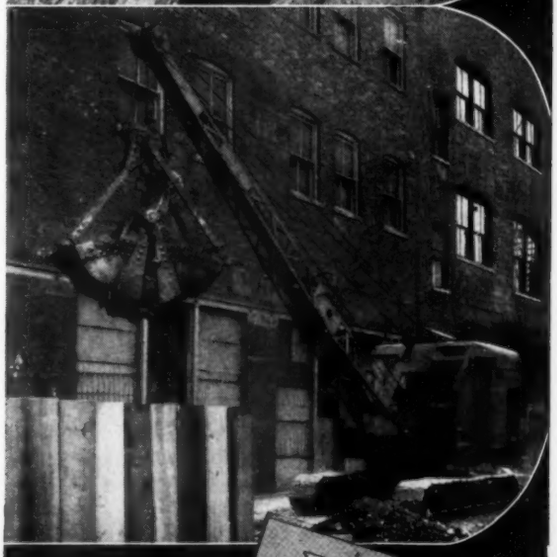
The new Buckeye Shovel Catalog fully describes and illustrates all Buckeye shovels, trench hoes, cranes and crane attachments. Complete dimensions and specifications are detailed for every Buckeye machine. The many advantages of exclusive Vacuum Power Control are explained . . . the feature that has made Buckeye the outstanding shovel in its class. Designed as a reference guide, this new Buckeye catalog can be used to advantage when considering new equipment to meet your overall job demands. Write for your copy of the new Buckeye Catalog No. 846 today.

BUCKEYE TRACTION DITCHER
Division of Gar Wood Industries, Inc.
Findlay **Ohio**

BUCKEYE CRANE ATTACHMENTS







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GAR WOOD GW INDUSTRIES

CONVERTIBLE SHOVELS · ROAD WIDENERS · TRENCHERS · SPREADERS · FINEGRADERS

I could walk down Main Street in my home city, look in the window of a shoe store that catered to the "low-cost" trade and see shoes on display at $3.00 a pair. By walking a couple of blocks along the street, I could look in the display window of another store which catered to the "higher priced" trade and see shoes at $12.00 a pair.

From outside, looking in, there was not much difference in the appearance of these two pairs of shoes. But I knew that if I bought the cheaper shoes, the inferior soles would need replacing in a few months, they would not take and hold a shine properly, in a short time they would lose their shape and take on that "middle-age spread," and the seams would probably start ripping out soon. On the other hand, I could wear the $12.00 pair a year or two without resoling, they would hold their shape, take and hold a neat shine, resist seam ripping, and feel comfortable on my feet.

If I had plenty of money, the choice was mine to make. Probably I would get my money's worth in either case, but the more costly pair would give me greater all around satisfaction. But if I were experiencing hard times, there would be only one wise choice for me (according to my means)—I would take the $3.00 pair.

In the case of highways, a governmental unit, instead of an individual, is the purchaser. If their tax funds are ample and the traffic involved is heavy enough to justify purchase of a high-type road surface, that is the logical buy. But if road funds are scarce and the traffic is light they should "fit their means" and purchase the low-cost road type.

In either case, it is poor economy and bad judgment to buy a high type surface on a low traffic road or a low-type surface on a heavily traveled road. The investment should fit the traffic needs. And let's get away completely from that dwindling practice of building a high-type road past "Joe Spivak's" residence or farm, to carry light traffic, just because it is felt in some quarters that Joe is of much greater importance and political influence than he really is.

Competent Personnel

To get the most from our limited road funds we should start right at the beginning and carry on efficiently through all the details of planning, financing, location, design, construction, operation, and maintenance. This matter of getting what we pay for involves more than money. It includes vision, judgment, initiative, courage and overall ability of the men employed in our various road departments. Those in the 3-B classification (Brass, Bull, and Bluff) should be replaced by competents as rapidly as possible.

Road work has long since ceased to be merely a "pick and shovel" operation. It has grown up into a huge industry requiring hundreds of millions of dollars for annual financing and tens of thousands of qualified men to carry on its ramified operations. Road improvement is a science. Its efficient, progressive, and economical functioning demands competent personnel, some trained in our engineering colleges and some trained by long, practical experience in the "School of Hard Knocks."

There are certain operations in highway improvement which should be handled by technically trained personnel. Included in these operations are design, some phases of construction and maintenance, supervision of testing, research, and some phases of traffic control. In the broad field of highway improvement we need men technically trained in the latest knowledge of stress analysis, strength of materials, chemistry, mechanics, hydraulics, surveying, etc.

Also, there are many phases of highway improvement in which the "practical" type of personnel (not necessarily college trained) is essential. The ability to work with and to handle men; the "know how" in operating and repairing the many types of road equipment; a proper slant on the best methods of drag maintenance on unstabilized surfaces, bituminous surface treatments and other low-cost types, the use of calcium chloride, the making and placing of concrete, drainage, pouring joints and cracks in concrete pavements, roadside maintenance; and the many other operations so necessary in efficient, economical road upkeep demand the services of many practical men. Common, ordinary, good horse-sense still commands a premium in "getting what we pay for" in road work. And it is scarcer than you might think!

Salary and Wage Scales

Now, how are we going to get and hold some of the best of our technically trained men and a proper share of good practical employees? Well, we won't accomplish this goal by maintaining the low salary and wage scales prevalent in many of our city, county, and state highway departments.

The competition with industry for such employees is "tough going" and usually the highway department comes out second best because of the higher salary and wage scales prevalent in industry. Recently, a road maintenance official said to me, "Particularly in the case of laborers, we get what industry rejects."

The attitude of the average citizen towards salary and wage scales for public employees is peculiar, to say the least. Obviously the high rates of pay for union equipment operators, skilled labor and unskilled labor on the contractor's payroll are directly reflected in the bids we get on road and bridge construction. Yet little is said about this by the average citizen. But let a city, county or state highway department attempt to provide a corresponding increase in employees' pay to meet the higher cost of living and, in many cases, individual citizens and organized groups will rise up in indignant opposition to what they call "a waste of the taxpayers' money." In one state, unless it has been changed recently by legislation, there is a top limitation of $5,000 on *any* state salary.

Yes, I know and appreciate the fact that a considerable number of top-notch men in their various fields have, in spite of low pay, remained year after year with city, county and state highway departments because of a deep attachment to their work, a spirit of self-sacrifice and loyalty, and a glimmering hope for better times ahead. My hat is off to them.

But through reasonable, adequate salary and wage scales we could attract so many more sorely needed, competent employees. And in doing so we could double the benefits by being able to displace the inefficient and incompetent employees.

Few industries in this country compare in magnitude and expenditures with that of highway improvement. Since it so vitally affects the everyday living and the pocketbooks of all of us, it really is important that we give more careful consideration to the personnel problems involved. This includes not only pay rates but reasonable job security, the latter of which is still at the mercy of the changing political winds in many localities. Yes, we do get about what we pay for in personnel, but not where frequent turnover is prevalent. The experience gained through job longevity is worth a lot of money.

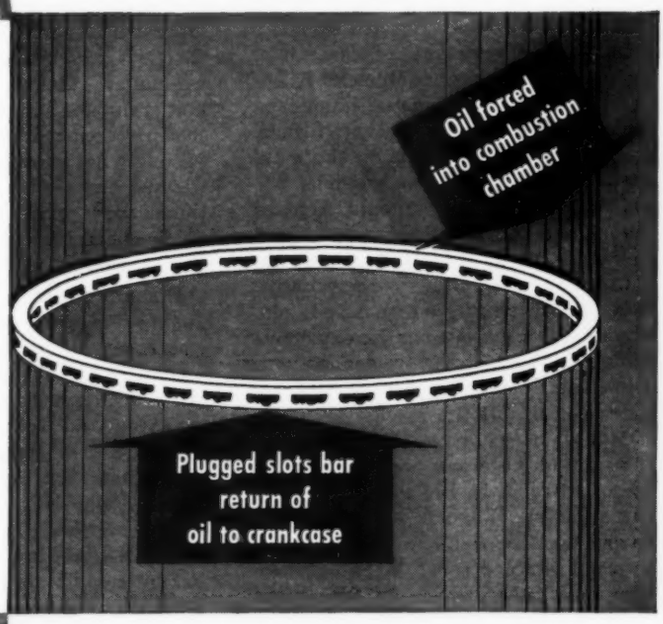
Equipment and Materials

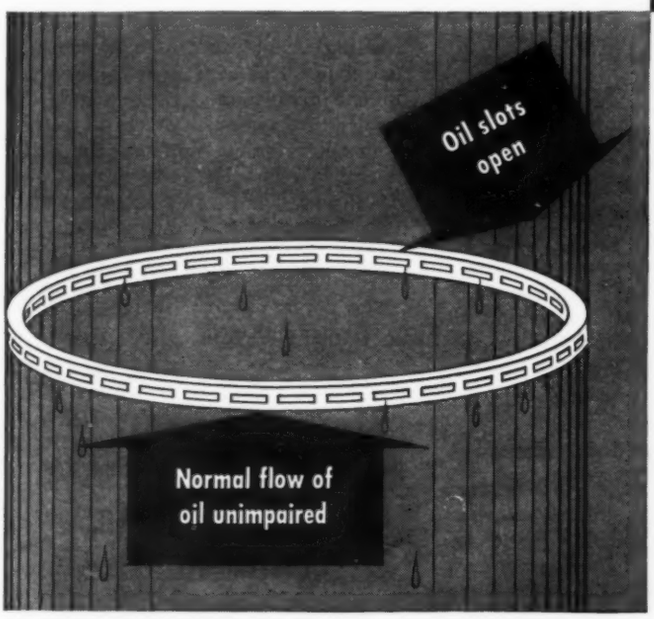
Now let's turn to equipment and materials for a while and see how our title fits in there. Many highway departments, particularly in the county and township levels, clung too long to the costly and inefficient horsepower (on the hoof) method of road improvement. And, strange to say,

Diesel Engine DANGER points

Plugged Oil Slots Increase Oil Consumption

When carbon and gum formations clog oil-ring slots, the oil which would normally return through these apertures to the crankcase is forced into the combustion chamber. Here it joins the other products of combustion which "coke" on the ring belt area cementing the rings in their grooves and aggravating the clogged condition of the ring slots.





RPM DELO Oil keeps oil slots open, prevents stuck rings

RPM DELO Diesel Engine Lubricating Oil is compounded to prevent engine deposits these three ways:

1. An oxidation inhibitor reduces the formation of gummy particles which form the binder for carbon deposits.
2. A detergent prevents deposits forming on rings and pistons, keeping engines cleaner.
3. A dispersive agent insures removal of this material when the oil is drained.

Other compounds in RPM DELO Oil minimize hot-spot wear, prevent corrosion, eliminate foaming.

To match the fine performance of RPM DELO OIL, use these equally efficient companion products from the same famous "RPM" line—RPM HEAVY DUTY MOTOR OIL —RPM COMPOUNDED MOTOR OIL—RPM GEAR OILS AND LUBRICANTS—RPM GREASES. For additional information or name of your distributor, write any of the companies below:

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DIESEL ENGINE RPM DELO LUBRICATING OIL

these "horse and buggy" ideas still prevail in some isolated communities. But some departments which long ago discarded mules for mechanical equipment are still rattling around with some of the first pieces of equipment they ever bought.

It is true that during and since the War the production of road equipment has been badly stymied by labor troubles and shortage of materials. However, some new equipment is being turned out despite the handicaps and, in the not too distant future, ample supplies should be on the market. Just as rapidly as possible, our highway authorities should replace the "junk" section of their equipment inventory with new and up-to-date equipment best suited to their needs. Like incompetent p e r s o n n e l, old, dilapidated equipment is an expensive luxury in any highway department. Inefficient operation and costly repairs eat up all the profits.

Many books have been written about road materials and I do not intend to tire you with a long, dry dissertation on this subject. Suffice it to say that there is *one best* material, or road surface type. Each of them that has been proven by time and usage under actual traffic conditions has a place in the scheme of road improvement. It is quite possible that any one of them could be justified as *the best* selection under a given set of conditions.

Don't overlook your local materials! Many such materials that have been considered inferior in the past are now proving their value and economy especially in our varied stabilization operations.

Specifications, Testing and Inspection

Specifications are an essential aid in getting the kind and quality of materials wanted. These specifications can vary from the rigid and elaborate type to the short, loose type covering only one or two qualities. In considering the degree of rigidity to apply in writing a set of specifications, I am reminded of the oft-repeated admonition of a famous professor away back in my college freshman year—"Do your work *only* to the required degree of accuracy!"

Of course, it requires some gumption to determine the required degree of accuracy—but not much. How many times have we shuddered at the lack of judgment on the part of a specifications writer, long steeped in the lore of rigidly tight specifications for high-type pavements, who, on being assigned the duty of preparing specifications for a low-cost type of road, "drew the lines" so tightly that the final result was a low-type road costing almost as much as a high-type pavement! We don't get our money's worth that way.

Unfortunately, some road engineers and officials seem to think that when an adequate set of specifications have been prepared for a specific project the anticipated quality of the resulting construction is assured. That is only the half of it! Unless we follow through with competent and reliable sampling, testing and job inspection we may get an end product quite different from what we had in mind when the specifications were written. Let's give as much careful attention to the latter three items as we do to the first.

I shall never forget one incident during the early days of my highway extension work in Indiana. I was making a county road inspection tour one morning with the commissioners, surveyor and road supervisor when we came to a contract job involving a concrete box culvert. The "old-timer," who for some questionable reason had been appointed as inspector on the job, immediately rushed up to us complaining loudly that the contractor was a crook and was trying to get away with poor concrete on the job. We said, "How come?" and he rushed over to the head-wall, from which the forms were just being stripped, yanked a hammer out of his hip pocket, swung it vigorously, and knocked off a chunk of concrete from the corner of the head-wall as big as my head. "See what I mean?" sez he, "Rotten concrete!" *The concrete had been poured the previous afternoon!* Competent inspection is of vital importance, not only to the unit paying the bill, but also to the contractor trying to make a living.

Importance of Maintenance

Just as soon as a road is built and opened to traffic we are, from then on, faced with a continuing and increasing problem of maintenance. This operation is necessary if we are to protect our investment and provide a smooth, safe riding surface for the traffic. In too many road departments, the vital importance of prompt and adequate maintenance is underestimated and it is relegated to a role of minor importance in comparison with design and construction.

I believe I can say without fear of contradiction that on most of our road mileage maintenance is not up to par. The destructive effects of traffic and climate are away ahead of maintenance operations. It is sheer folly to pour so much of our available funds into new construction that we necessarily must skimp on our maintenance budget.

The enforced curtailment of highway improvement projects, coupled with the destructive effects of abnormal truck loads during the war years, call for extraordinary maintenance and repair operations *now*. Add to this the very appreciable increases in costs of materials, equipment and labor, and it is easy to see why maintenance budgets should be drastically revised upwards. Yet, many road departments are forced to struggle along under the same annual maintenance budget they had before the war! And traffic is increasing daily. We get about what we pay for in road maintenance providing we do it in time. Neglected maintenance is much more costly when we finally get around to it.

One final comment. It is on the attitude of some individual employees, and possibly their division heads, to the effect that a designer should do nothing but design, a location man should stick to location, a maintenance man should do nothing but maintenance, a bridge construction man should do no road construction, etc., etc. I grant that specialization may have its advantages in cashing in on years of experience in one field. But in times of slack work in one division and overwork in another, there seems no logical reason why there should not be some shifting of personnel except where living conditions, health or other vital matters are a factor. Highway employees should be working primarily for the highway department and not exclusively for their own particular division or section.

Mail Inserted Card of Inquiry Blank (page 112) for Equipment Data

Again this issue of Roads and Streets carries descriptions of many new labor-saving efficiency devices and latest material developments. See our New Equipment and Materials Section beginning on page 91, for which a numbered reply card has been inserted to help you request data on items that interest you. Also on page 112 is an inquiry blank and advertisers' index which will help you get data on equipment and materials you need.

Blade Replacement

Replace and Reinstall Your Scraper and Dozer Blades Properly

By Cloyd Richards
General Service Manager,
R. G. LeTourneau, Inc.

FOR some models, there are different types of blades available, the hard-faced type and the plain type. The hard-faced type is the same as the plain type except that the edges of the blade are protected by a strip of special metal welded along the edges of the blade. This feature enables the blades to be self-sharpening and reversible, since the hard-facing is on the top side of the blade. Thus, the softer heel will wear away more rapidly and the blade will become sharper with use.

The initial cost of a hard-faced blade is higher, but calculated on a cost-per-yard basis, it is cheaper than a non-hard-faced blade.

In some instances, a one-piece blade is desired instead of a three-piece blade. This feature is available only on certain scrapers. The one-piece blade is usually used on jobs where fine finishing is to be done with the scraper, otherwise the three piece, offset type is recommended.

Changing Blades

Scraper or Dozer blades should be reversed or replaced before they wear back into the blade base, otherwise permanent damage may result to the blade base or bottom section of the equipment.

On the Carryall Scraper

To change a Scraper blade, proceed as follows:

Hoist the scraper bowl to its full height and place blocks under the bowl to prevent it from dropping in case someone should accidentally release the Power Control Unit hoist brake. The apron should likewise be raised to its full height and blocks placed between the apron arms and side sheets to keep it from dropping in case the brake on the dump cable is accidentally released. Then, using a blade wrench, remove the bolts that secure the blades to the blade base. If the blades have not already been reversed, they can be used again by turning them over and wearing them along the other edge. If you reverse the end blades, it is necessary not only to turn them over but also to move them from one side of the scraper to the other.

Use Proper Row of Holes

After placing the blades in proper position, the use of a round drift punch will be very helpful in lining up the holes. At this point be sure the proper row of holes is being used. Otherwise, on the offset type of blade, a portion of the blade will project above the scraper bottom which will endanger the tailgate, due to rocks and dirt that may wedge between the upper section of blade and tailgate as the tailgate is moved forward to eject the load.

When installing the blade bolts, tighten them down evenly and make sure all are tight.

Always be sure the blades are installed with the bevel in the position shown in Illustration A.

Dozer

All dozer blades consist of a center section and two end or tip blades. The center blade is reversible (the same as for scrapers), but the end blades or tips may not be.

Be sure no part of the blade is allowed to wear back too far or permanent damage to the dozer bowl may result.

To remove the blade from the dozer, first raise the bowl off the ground high enough to conveniently reach the nuts on the lower ends of the blade bolts with a wrench. As a safety precaution, place blocks under the bowl to prevent it from dropping in case the Power Control Unit brake should be accidentally released.

Be sure when dozer blade is reinstalled that the blade bevel faces down, as shown in Illustration B.

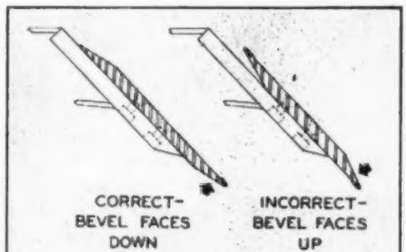

ILLUSTRATION A: Carryall Scraper blade.

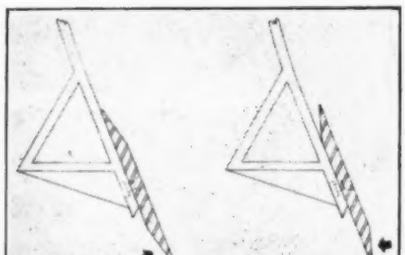

ILLUSTRATION B: Dozer blade.

Meetings Ahead

Associated General Contractors of America, Inc. — annual convention, Stevens Hotel, Chicago, Jan. 27-30.

Associated Equipment Distributors —annual meeting, Edgewater Beach Hotel, Chicago, Feb. 13-16.

American Road Builders Assn.— 44th annual convention, Palmer House, Chicago, Feb. 17-20.

Association of Highway Officials of North Atlantic States—annual meeting, Hotel Traymore, Atlantic City, N. J., Feb. 26-28.

(*Continued from page 77*)

opening up road working from the lower reaches upward would have been virtually impossible without a tractor plow. The operator has usually found it easier to work across grade, casting snow over the bank in diagonal cuts of the one-way apron. Plow aprons also have done a bit of gravel blade work in the process, but a bulldozer was kept close behind the plow whenever needed. As the work progressed the motor graders cleaned up minor snow pockets and fresh falls and kept up a continual reshaping and blading operation to combat the washing from daily thaws.

The job has been hard on the men, too. Labor turnover has been high, and at the time of your editor's visit the 15-man crew consisted of volunteers from other parts of the Pueblo division of the highway department. Operators don't like the high altitude, and the constant work on steep grades along narrow shelf location "a mile above nowhere" has made them glad to get back down to safer work. No mishaps have occurred, however, thanks to a program of caution and observance of safety rules.

The road as it exists today is a remarkable example of mountain location, and short of complete reconstruction and relocation could hardly be improved upon. A definite need for a stabilized surface is seen. The road up Mt. Evans near Denver, which climbs to an even higher altitude, came through the war shut down with surprisingly little need of repair, thanks partly to its easier grade but principally to the existence of a well built bituminous surface. The only seriously damaged section of the Mt. Evans road occurs across a shelf at elevation 11,700 where ice lenses have bulged the pavement badly.

H. K. Bishop New ARBA Executive

H. K. Bishop

Hubert K. Bishop, a former deputy commissioner of the Public Roads Administration and well-known highway engineer, has been appointed manager of the County Highway Officials Division and the Municipal Division of the American Road Builders' Association. He succeeds Major John A. Long who resigned last summer.

The new ARBA official received his engineering degrees at Cornell and began his career as assistant city engineer in Hudson, N. Y. Later he was superintendent of public works for that city. He had held many important posts such as superintendent of public works for the Territory of Hawaii; chief engineer Indiana State Highway Commission, first deputy New York State Highway Commission, and consulting engineer with several prominent engineering firms before joining PRA. He will assist in the activities of the American Institute of Local Highway Administration which was founded at the ARBA convention in Chicago last January.

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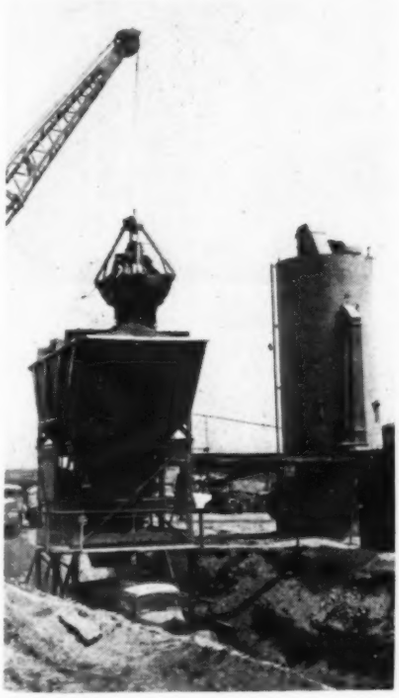
MAINTENANCE TOOLS
PE-15 Maintenance Set includes necessary OTC TOOLS for repair work on track-type tractors, Diesel motors and all types of road maintenance machinery.
CUT DOWN
LAY-UP TIME
Repair jobs on road machinery are speeded up SAFELY—on the job or in the shop—with the portable OTC PULLING SYSTEM. It removes and replaces gears, bearings, sleeves, wheels, shafts and other close-fitting parts—easily, quickly and without damage. A set of OTC PULLERS will pay for itself on one job, in time saved alone. Approved by Hyatt, M-R-C, New Departure, SKF and Timken for use in pulling and installing their bearings.
OTC GRIPOMATIC PULLERS, PUSH-PULLERS, Pulling Attachments and Adaptors, BOX WRENCHES and other tools are made in sizes to handle practically every maintenance job.
Write for OTC Maintenance Bulletin showing some of many time-saving uses of OTC TOOLS.
OWATONNA TOOL CO.
319 CEDAR ST., OWATONNA, MINN.

New Construction Equipment and Materials

1.
New Automatic Batcher and Silo

The Conveyor Company of Los Angeles, Calif., has recently improved its Conveyco equipment, utilizing new developments in scales for weigh batching to make possible extremely fast batching. The Conveyco Auto-

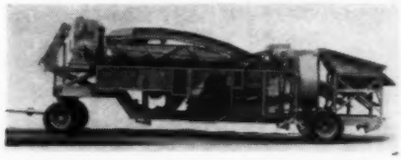


Conveyco 160-ton Capacity Automatic Batcher and 450-bbl. Cement Silo on Griffiths Company contract, U. S. 99, Calif.

matic Batcher of 160-ton capacity and Silo (450 bbl.), pictured herewith, are reported to have averaged 665 cu. yd. of concrete per 8-hr. day, batching four kinds of aggregate on a California highway job, with 929 cu. yd. on peak day. Accuracy within 10 lb. on 3,000-lb. batches are claimed. The Silo works on a simple circulating system which keeps the cement hopper full at all times. For complete data on this fully portable and adaptable equipment, write the manufacturer as named above.

2.
New Crushing and Screening Plant

A new, small, portable crushing and screening plant called the Pitmaster Straightline has recently been announced by Iowa Manufacturing Co., Cedar Rapids, Ia. The primary crusher is a 10 in. x 16 in. roller bearing jaw crusher and the secondary is a 16 in. x 16 in. roller bearing



Pitmaster Straightline Crushing and Screening Plant

roll crusher. The 30 in. x 9 ft. 5 in. double-deck horizontal vibrating screen gives the plant exceptionally low traveling height. Conveyors are all ball bearing, channel-frame type for light weight. Pulley shafts have special permanently sealed, self-aligning anti-friction bearings. Elevating wheel return system makes the Pitmaster short and narrow and speeds handling of the crushed oversize aggregate from the crusher to the screen. The plant is offered with a choice of reciprocating feeder or swivel feed attachment to fit different feeding conditions. Other optional equipment includes chip attachment, bins with delivery conveyor extensions. Total weight of the Pitmaster is 31,000 lb. without power unit; transport length with feeder attached is 33 ft. and traveling height 11 ft. The plant is operated by a 50-60 H.P. gasoline or diesel engine. The Pitmaster is a complete gravel plant and can be quickly converted into a modern quarry plant by putting a 15 in. x 36 in. or 15 in. x 24 in. portable primary ahead of it.

Mail Inserted Card

for data on equipment described on these pages. See also inquiry blank on page 112.

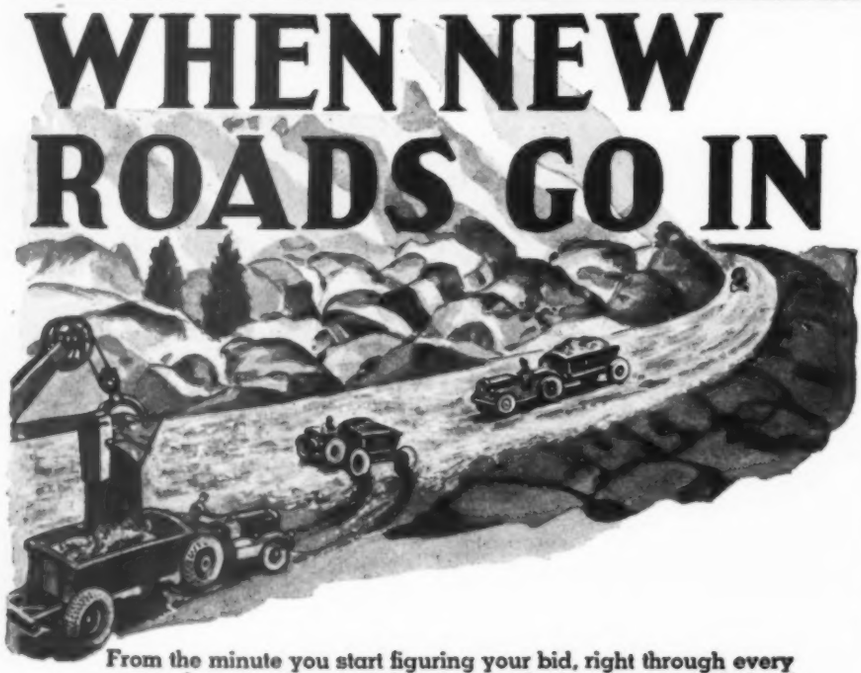
3.
Bulldozers and Gradebuilders

Bulldozers and gradebuilders developed specially for the new Allis-Chalmers 2-cycle Diesel powered HD-5 tractor have been announced by Baker Manufacturing Co., Springfield, Ill. Starting from tractor blueprints, Baker 'dozers were designed into the HD-5, to match tractor power, size, and speed—built to main-

Baker Bulldozer

tain tractor balance, stability and traction—mounted to save wear, tear and maintenance. The HD-5 is a small tractor with big tractor design, engineered completely new throughout, featuring a drawbar pull of 37.4 h.p., with five speeds from 1.46 to

WHEN NEW ROADS GO IN



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5.47 m.p.h., 1000-hour roller and idler lubrication, full visibility for the operator, and simplified maintenance. Baker adds to these tractor features with the following built-in bulldozer advantages—direct down pressure, low pressure hydraulic system, less linkage, fast blade control, and rolling blade action.

4.

New Magnetic Guide for Flame Cutting

A new magnetic straight edge guide for use in flame cutting steel plates and shapes with a hand torch is now being offered by Universal Power Corporation, Cleveland, O. The entire assembly is made of a specially heat-treated aluminum alloy that will not warp from heat, is lightweight and resistant to corrosion. The aluminum holders are provided

Cut-O-Guide in Use

with specially cast Alnico magnets which exert a 30-lb. pull and hold the straight edge rigidly in place whether the plate is rusty, oily, or painted; flat or curved; in any position, horizontal, vertical or overhead. The detachable holders can be secured at any point along the straight edge by means of a thumb screw so that either, or both, ends of the straight edge can be extended beyond the edge of the plate to be cut.

5.

Device for Activating Road Signs

An automatic, electrically controlled device — the "Winko-Matic" — that gives a "blinker" effect to standard road signs, has been announced by the Winko-Matic Signal Co., Lorain, O. The principle used in the device is alternating motion. The mechanism, when bolted or welded to the sign, produces the same effect as that

given by the well-known railroad crossing "Blinker" signals, an on and off flash. The illustration at top right shows a standard roadside Stop sign with the "Winko-Matic" mechanism installed. The picture at lower left shows rear view with "Winko-Matic" box, and the small picture, lower right, shows winker arm and motor. They give a clear idea of how the device looks and functions. The design and construction of this equipment is very simple. It is available in three sizes, 18, 24, and 30-in., and can be easily and quickly installed on practically all types of standard roadside signs. All that is necessary for installation is the cutting of two openings for the insertion of the two colored lenses and the bolting of the mechanism to the back of the sign. As the mechanism is enclosed, it is proof against rain, wind, and temperature changes.

"Winko-Matic" Installation

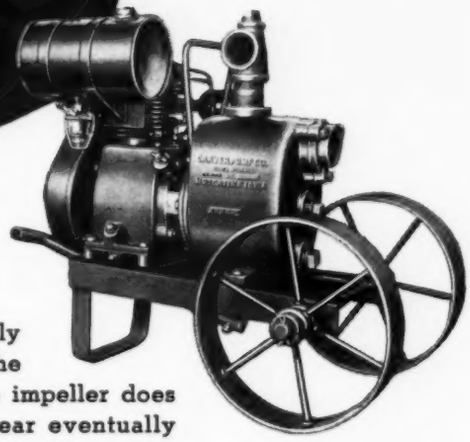
6.

New Ring Compressor

A new OTC ring compressor HC-686, designed with the cooperation of International Harvester service men, has been put on the market by Owatonna Tool Co., Owatonna, Minn. It is the same as the ring compressors being used on the assembly line. Made especially for use on I.H. "14" and

OTC Ring Compressor

HERE'S ANOTHER REASON WHY CARVER PUMPS ARE BETTER



UNLIKE ordinary pumps, Carver Pumps have only two parts that are subject to wear—the impeller and liner. Both are designed to keep wear to a minimum. The impeller vane can wear only on one side. Backhead of the pump lasts a lifetime because impeller does not wear against it. When wear eventually occurs in the impeller and liner, they can be replaced easily, quickly and at low cost thus making the pump as good as new.

Carver Pumps are offered with a choice of power and mounting in sizes from 1½" to 10" *Write for catalog.*

CPC CUTS PUMPING COSTS

CARVER PUMP CO.
Muscatine, Iowa

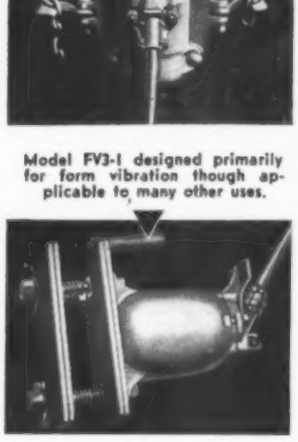
$ave TIME-MATERIALS - MONEY - Insure Better Quality with JACKSON EXTERNAL VIBRATORS

Model PTV-21A. A heavy duty unit for consolidation of concrete in Pipe Forms from 36" to 120" diameter. Model PV-4, a smaller, but similar unit is designed for pipe up to 36" diameter.

IN CONCRETE PIPE MANUFACTURE

the use of a JACKSON external Vibrator will permit the use of drier, more economical mixes, greatly reduce puddling time, permit earlier stripping of forms and produce stronger concrete with a far higher degree of impermeability. Vibration is transmitted uniformly to form. Quickly attached by means of encircling chain.

Model FV3-1 designed primarily for form vibration though applicable to many other uses.



WHERE INTERNAL VIBRATION IS IMPRACTICABLE

in such concrete construction applications as tunnel linings, or wherever sections are so heavily reinforced that internal vibration is impossible, the Model FV3-1 is literally worth its weight in gold. Quickly clamped to forms, it provides thorough vibration with all the resulting economies and higher quality of work.

The "S" Motor, shown with brackets — one of several types of fastenings available for movement of materials applications.

MOVEMENT OF MATERIALS

from or to bins, hoppers or chutes is positively facilitated by attachment of a JACKSON external vibrator designed for permanent fastening. Keeps materials in motion, eliminates waste, stoppages and time losses.

The PT-21A Motor. Similar to the "S" but more powerful. Supplied with desired fastenings for jobs requiring extra heavy vibrations.

TROUBLE-FREE OPERATION

All of the JACKSON external vibrators shown here are built around our "S" type motor and its big brother motor Model PT-21A. They are free from brushes, rings and those small parts usually responsible for trouble. They operate on 110-120 or 220 Volt, 3 phase, 60 Cycle A.C. at approximately 3600 V.P.M. 4800 V.P.M. may be had with use of frequency changers or from JACKSON Power Plants.

Write for detailed literature or recommendations for any special vibration application.

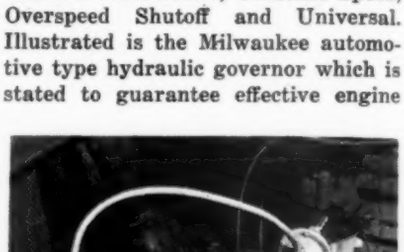
ELECTRIC TAMPER & EQUIPMENT CO.
LUDINGTON MICHIGAN

"18" diesel engines, it is quick-acting and easy to use. The connecting rod, with piston attached is clamped in a vise. The two halves of the compressor are placed over the piston and snapped together until the clips snap in place.

7.

New Hydraulic Governors

A new principle of governing, made possible by combining the principles of hydraulics and centrifugal force, has been announced by the Milwaukee Lock & Mfg. Co., Milwaukee 4, Wis. Four standard types are now in production: Automotive, Constant Speed, Overspeed Shutoff and Universal. Illustrated is the Milwaukee automotive type hydraulic governor which is stated to guarantee effective engine



Milwaukee Automotive Type Governor

control, maximum sensitivity, and efficiency without loss of power. The governors can be adapted to any gasoline or diesel motor. They are available in all standard sizes. The outstanding feature claimed for these governors is their flexibility of power take-off in relation to governor control. This flexibility permits the power source for driving the pressure generator to be located as far as 30 ft. from the governor control without loss of operating efficiency. Other features are: revolutionary, tamperproof design, interchangeability between different throttle body sizes using the same pressure generator, ease of installation, and economy.

MANUFACTURERS' LITERATURE

8.

Clamshell Buckets

In its new Catalog No. 2076, Blaw-Knox Co., Pittsburgh, Pa., has ingeniously presented its 2-line buckets

in a manner which makes it easy for a prospective user to make his own selection. A combination of pictures and factual data enables a bucket user to coordinate his crane capacities with the data presented and select exactly the right bucket—whether it be for rehandling, hard digging, or dredging.

9.

Cor-Ten High Tensile Strength Steel

Complete data on the properties, fabrication, and application of U.S.S. Cor-Ten are presented in the 68-page, 8½ x 11 in., liberally illustrated, 2-color booklet "U.S.S. Cor-Ten," just published by United States Steel Corporation Subsidiaries. The first section discusses the various properties of this well-known high tensile strength steel, including its high resistance to atmospheric corrosion, and outlines how they may be utilized to best advantage. In the second section full data are given regarding fabrication by standard practices, including five pages on welding. The second half of the new booklet deals with the applications of U.S.S. Cor-Ten in various fields. Test data, lists of equipment and users, together with photographs and charts, are liberally used to illustrate and substantiate the claims made for the various properties and applications of U.S.S. Cor-Ten.

10.

Pouring Babbitt Bearings

"How To Pour Bearings" is the title of a two-color, illustrated wall card recently published by Joseph T. Ryerson and Son, Inc., Chicago, Ill., steel distributors and manufacturers of Glyco babbitt metals. With a series of six cartoon type pictures, the steps necessary to secure good, tightly lined bearings are made clear and easy to follow. The instructions are printed on card stock suitable for hanging in the shop.

11.

Earthmoving Equipment

The accomplishments of rubber tired equipment on medium and long earthmoving hauls where ground conditions are conducive to the use of wheeled vehicles are recorded in the new booklet, High Speed Earthmoving, published by Caterpillar Tractor Co., Peoria, Ill. Such operations as are found in airport con-

Now coming through in ever-increasing quantities and well worth waiting for!
BRIGGS & STRATTON ENGINES
Value-wise users, dealers, and manufacturers of gasoline powered equipment insist: "We can't take chances on untried engines. Experience has taught us that long, successful operation depends so much on the engine, we want our appliances, farm machinery, and industrial equipment powered RIGHT — with Briggs & Stratton air-cooled engines."
Yes—with their 26-year record Briggs & Stratton engines are well worth waiting for. Deliveries are improving with our increased production. Continue to demand "powered by Briggs & Stratton"—and be assured of years of dependable, trouble-free performance.
BRIGGS & STRATTON CORPORATION
MILWAUKEE 1, WISCONSIN, U. S. A.
4 CYCLE
BRIGGS & STRATTON
GASOLINE ENGINES
Air-Cooled Power

HIGHWAY CURING
ECONOMY DEMANDS
KEYSTONE
KAPCO Concrete Curing Compound
Kapco Concrete Curing Compound continues to replace the less economical and outmoded methods of curing used in the past. Unaffected by wind or weather this membranous film provides the maximum moisture retention during the critical curing period and requires no after expense of a removal crew. Easily applied, this "wax-free" resin based compound prevents surface dusting, minimizes hair checking, crazing and reduces shrinkage. Write for complete information and technical data.
Kapco Concrete Curing Compound
KEYSTONE ASPHALT PRODUCTS COMPANY
A Division of the American-Marietta Company
43 E. OHIO STREET, CHICAGO 11, ILLINOIS
ASK ABOUT THE NEW EQUIPMENT LINE FOR CONCRETE CURING COMPOUND APPLICATION

struction, levee building, highway construction, rock and gravel handling and snow removal, with wagons and scrapers utilized to handle the load, are dramatically told and graphically illustrated in the eight-page color booklet.

12.

Truck Mixers

The 1947 line of Rex Moto-Mixers is illustrated and described in Bulletin 46-8, just released by Chain Belt Co., Milwaukee, Wis. Closeup photographs are used to illustrate many features—such as the new water nozzle and its position in the drum; the bolted on, replaceable mixing blades; the patented air vent in the charging hopper; the chain drum drive, etc. Diagrams are also profusely used to show the paths of mixing action; the rotation of the drum; the complete water system, etc. Information is also given on chute lengths, and the method of mounting. Included in the bulletin is a complete set of specifications, photographs of each of the three drum sizes, and two pages of job pictures.

13.

Equipment Trailers

Five models of Hanson gooseneck trailers are illustrated and described in recent catalogs of the Hanson Clutch & Machinery Co., Tiffin, O. General specifications for each model are included. These five models are: The 10 ton, 15 ton, 20 ton, 30 ton and 40 ton. Features of the trailers are the frames made of H-section alloy steel and double-oscillating wheel units.

14.

Cost Keeping System for Trucks

A complete set of sample forms required to set up a simplified system of keeping operating cost records has been made available to truck owners by the Four Wheel Drive Auto Co., Clintonville, Wis. The system was developed by the FWD Service Department during over 35 years of truck manufacture. Only four forms are used: The driver's daily report, repair labor slips, monthly report and yearly report. The first form to be filled out is the driver's daily report. These reports are bound in a handy 4½ x 8 in. book which the driver

USED THE WORLD OVER

RUGGED
IS THE WORD FOR
PERFECTION
BODY *and* HOIST
CONSTRUCTION

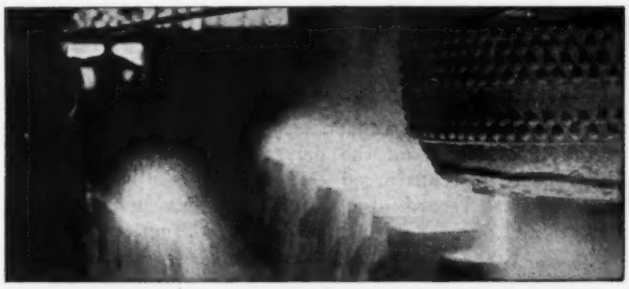
Write for name of nearest Perfection Distributor

THE PERFECTION STEEL BODY CO.
Galion, Ohio

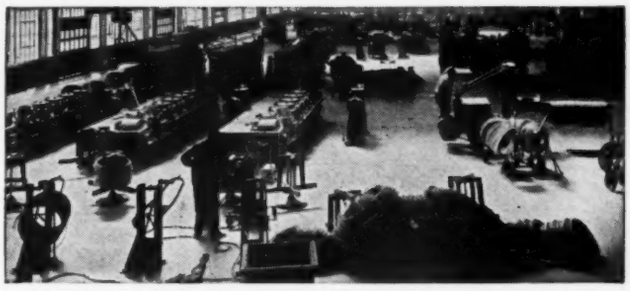
PERFECTION
STAKE and DUMP BODIES
HYDRAULIC HOISTS

FOR ANY TRUCK
STANDARD or SPECIAL UNITS
IN ALL SIZES - FOR ANY USE

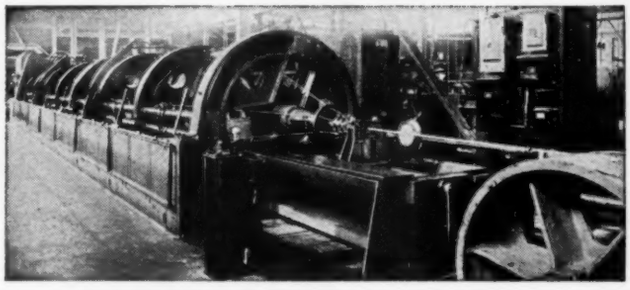
FROM THE MAKING OF THE STEEL—



THROUGH PROCESSING THE WIRE—



TO FABRICATING THE WIRE ROPE—



WICKWIRE SPENCER WIRE ROPE

is safeguarded by continued, careful control to assure the utmost in performance, safety and long life. Wickwire Spencer Wire Rope is available in all sizes and constructions—both regular lay and WISSCOLAY *Pre*formed.

HOW TO PROLONG ROPE LIFE AND LESSEN ROPE COSTS...

Thousands of wire rope users—old hands and new—have found "Know Your Ropes" of inestimable value in lengthening life of wire rope. Contains 78 "right and wrong" illustrations, 41 wire rope life savers, 20 diagrams, tables, graphs and charts. For your FREE copy, write

Wire Rope General Sales Office
Palmer, Mass.

WICKWIRE SPENCER STEEL DIVISION
The Colorado Fuel and Iron Corporation
THE CALIFORNIA WIRE CLOTH CORPORATION

keeps in his possession. At the end of each working day, he fills out and turns in his daily cost report. The driver's daily report is running account of the truck's performance and forms the basis for the monthly and annual operating cost report. Each day the information on the driver's daily report is transferred to the monthly report record of one truck. When there is a repair labor slip turned in, that information also is entered on this form. At the end of each month the items are totaled and entered on the yearly report. The annual report lists each month's operation separately and can be used as basis for comparison.

15.

Convertible Power Shovel

An informative 36-page catalog has just been published by Buckeye Traction Ditcher Co., Findlay, O., on the Buckeye convertible power shovel. Advanced features of this versatile unit — including vacuum power control, non-clogging crawlers, balanced weight, and fast, positive crowd, hoist, swing and travel—are pictured and described in detail. Also illustrated and described is the quick and ready convertibility from a power shovel to trench hoe—drag-line or crane, clamshell, hook block or magnet—or pile driver. The maker's truck crane and high lift shovels are also pictured and described.

16.

Diesel Engine Maintenance

A revised and enlarged bulletin issued by Owatonna Tool Co., 319 Cedar St., Owatonna, Minn., shows the easy, fast and safe ways to handle many industrial and diesel maintenance operations involving the removal and replacement of gears, bearings, pinions, bearing cages and races, sheaves, sleeves, pulleys, fly wheels, shafts, flanges and many other parts usually difficult to remove without damage. Also illustrated are the new OTC industrial maintenance and diesel service sets, providing a complete OTC pulling system to meet the needs of contractors, highway departments, etc.

17.

Pulling and Pushing Tool

The Simplex Util-A-Tool is pictured in many operations and completely described in a new bulletin released by Templeton, Kenly Co., 1020 S. Central Ave., Chicago 44, Ill.

Actually, that Donaldson Air Cleaner-equipped engine is enclosed in a dust-tight box, bolted to a concrete stand in the Donaldson laboratories, and doesn't move an inch. But during a certain hour-long test, the air cleaner is fed as much dust as it would ordinarily handle in 3000 miles of truck or bus service.

This arrangement also permits other tests:

1. No dust is fed to either engine or cleaner to determine engine wear factor.
2. Engine operates in dust cloud—clean air fed to induction system to check engine for possible dust leaks.
3. Dust fed to cleaner with engine operating in dust-free atmosphere to check air cleaner efficiency and its relation to engine wear.

Such tests with Donaldson Air Cleaners assure you of efficient, dependable dust protection.

WRITE US ON *YOUR* DUST PROBLEM

DONALDSON CO. INC.
666 Pelham Blvd., St. Paul 4, Minn.
Sales Engineers: Chicago, Detroit, Cleveland

WITH THE MANUFACTURERS & DISTRIBUTORS

Tractomotive Corporation Formed

Tractomotive Corporation was recently formed by Paul B. Cochran, who is its president and treasurer and who recently resigned as general manager of the Buckeye Traction Ditcher Co., and V. M. Dobeus, who recently resigned as chief engineer of the tractor Division of the Allis-Chalmers Manufacturing Co. These men have spent their entire business lives in the construction industry. The objective of Tractomotive Corporation is to create and fabricate items for indus-

trial wheel and crawler tractors. The company is an Illinois Corporation with Chicago offices at 228 No. LaSalle St., their plant and engineering department is now operating at Findlay, O., with offices at 101 W. Sandusky St.

Radio Speeds Surveying

Surveying of power lines by a speedy method which may find application in other engineering, including highway location, has been reported in news dispatches. Devised by two engineers at Texas University, it utilizes radio in a procedure described as follows: One member of the survery party, using a short-wave transmitter, broadcasts a signal in the general direction of the intended survey line. Another member, perhaps hidden from view on ahead by trees, hills or other obstacles, picks up the signal with earphones attached to a receiving set. He walks back and forth across the beam until he finds the critical (loudest) point, at which he sets a stake. The system is said to be useful for survey work in which accuracy within about one-half degree projections will suffice. Proponents state that a two-man party can make four or five miles a day on power line location, compared to a mile or so by usual methods.

LeTourneau Moves Eastern Sales Office

R. G. LeTourneau, Inc., Peoria, Ill., has moved its eastern sales office to 1026 17th St., N.W., Washington, D. C. The office is under the management of O. A. (Jack) Williams, district representative in 1944. Also at the Washington office is Henry Cain. Cain comes to LeTourneau as assistant to the Eastern sales manager after five years' service with an aviation battalion in the Corp of Engineers. As commander of a construction company, he participated in the construction and maintenance of major air fields in the South Pacific theater of war. Before his Army service, he was with Sinclair Refining

O. A. Williams and Henry Cain

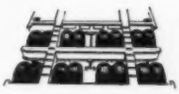
Save ON HEAVY HAULING COSTS with a W-W low-bed

Here's the time-tested, low-cost, dependable way to move your machinery, equipment and materials to the job — quickly, safely with a minimum of man and tractor power.

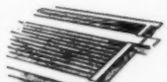
PAY LOAD averages 6 lbs. to one of dead weight. LIGHT OPERATIONAL DRAFT takes less tractor power. EXCLUSIVE TWO-PIECE LOADING RAMPS speed loading and unloading, save on manpower . . . LOW FIRST COST means a saving *now* and the HEAVY DUTY CONSTRUCTION of these W-W Low Beds insures savings in operational expense on the job.

Only W-W low-beds gives you these exclusive advantages

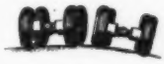
Hinged loading ramps speed loading and unloading of self-propelled equipment with less manpower.



Interchangeable 8 or 16 tire unit. Tandem axle models double capacity when desired by adding eight extra tires.



Heavy duty frame is "built to take the load". Design distributes weight over entire bed area — assures long life and trouble-free service.



Tandem Bogie axles conform to road contours—allow load to ride evenly on all tires constantly.

IMMEDIATE DELIVERY available on 10 to 40 ton models

WRITE TODAY for FREE catalog. Contains pictures of 10 to 60 ton low-beds, complete specifications and other interesting information on how you can lower your heavy hauling costs. Simply attach coupon to your letterhead and

Mail today

The WINTER-WEISS Co.
2201 Blake St., Denver 2, Colorado

Gentlemen: Please send me pictures and data on your Low-Bed Machinery trailers. We are particularly interested in a_____ ton capacity model.

Firm Name_____

Address_____

City_____ Zone____ State_____

By_____ Title_____

Co.'s construction department, working on maintenance and servicing of that concern's installations.

•

New Mack Factory Manager

Helmer Peterson, heretofore at the Mack Plainfield, N. J., plant, has been appointed factory manager of Mack-International Motor Truck Corporation's Long Island City, N. Y., plant. In his new capacity Mr. Peterson will oversee the manufacture of Mack fire apparatus, as well as the fabrication of replacement parts for obsolete models of the entire Mack line.

Personnel Changes by "Caterpillar"

M. A. Clements has been appointed seervice manager of western division of Caterpillar Tractor Co. at San Leandro, Calif. Mr. Climents joined the "Caterpillar" organization in 1936, shortly after he was graduated from Syracuse University with a degree in mechanical engineering. Following a 2-year engineering apprentice course he spent a year in the company's research laboratory, joining the service department in December, 1939. In 1943 he became service engineer and, a year later, was named Central Division service manager. He succeeds R. E. Nayo, Western Division service manager since 1940, who has taken charge of the company's San Leandro field research office. J. D. Uhll, service engineer since 1944, succeeds Mr. Clements as service manager for the Central Division. Mr. Uhll joined the company in 1936 and after considerable experience in the research laboratory was transferred to the service department in 1940. E. M. Iverson, in turn, succeeds Mr. Uhll.

•

Appointed General Plant Manager

H. J. Hocker

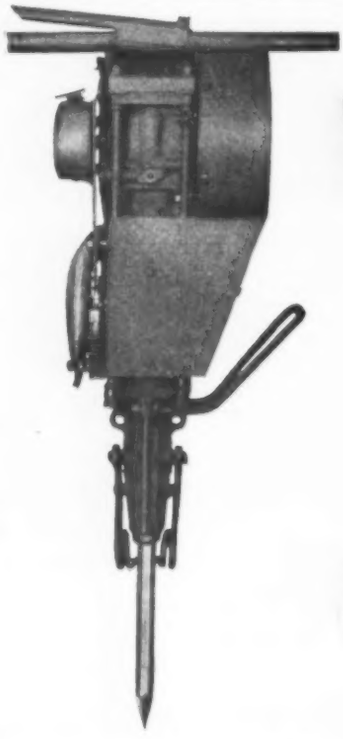
H. J. Hocker, former chief of production for Chicago Engineer Procurement District, and recently returned after 26 months' duty with troops in the European Theatre as regimental commander of engineer units, has been appointed general plant manager of the C. R. Jahn Co., Chicago, Ill., manufacturers of heavy-duty low-bed trailers. He entered military service in January, 1942, as major, Corps of Engineers, and was separated from the army in June, 1946, with the rank of colonel. For ten years preceding the war he was chief inspector for Chicago District of U. S. Engineer Department.

•

Named Plant Engineer for Goodyear

H. A. Walker

Harry A. Walker has been appointed plant engineer at Goodyear Tire & Rubber Co.'s tire factory in Lecheria, Mexico. This plant recently expanded, produces tires, tubes and mechanical goods. Walker, a long-service member of the company's engineering staff, joined Goodyear in 1917, left to study mechanical engineering at Ohio State University and returned in 1921. During the recent war he was industrial engineer and safety manager of the Charlestown, Ind., powder bag loading plant, operated by Goodyear for the government. His latest assignment in Akron was in the power house division.



SYNTRON

100% Self-Contained

GASOLINE HAMMER

PAVING BREAKERS

BUST Concrete
DIG Clay or Shale
(or frozen ground in winter)
CUT Asphalt
TAMP Backfill
Quickly and Easily

Their powerful, hard-hitting 2,000 blows per minute save time and money on such jobs.

Write for Folder #8-45.

SYNTRON CO.
384 Lexington Ave., Homer City, Pa.

The Leader
IN WELDED CONSTRUCTION

WELLMAN

Williams Type BUCKETS

Wellman pioneered in the welded construction of rolled steel buckets. Priceless experience, superior engineering and the finest type of construction guarantee you more satisfaction from your Wellman-built buckets.

SEND FOR BULLETIN

THE WELLMAN ENGINEERING COMPANY
7003 CENTRAL AVENUE • CLEVELAND, OHIO

You get a real lift with a HANSON Crane

Low center of gravity; full revolving; air controlled steering; extra long crawlers; all clutches easily adjusted and relined without dismantling shaft assemblies; heavy duty industrial type gasoline or diesel motor; and other outstanding features!

Write for Catalog RS-126.

Rated at 4½ ton lift (the larger size is rated at 6½ ton) this rugged smaller brother in the Hanson family can juggle its rated tonnage with effortless ease and have hoisting power to spare!

It is quickly convertible to Shovel (⅜ yd. and ½ yd.) Dragline, Clamshell or Trench-hoe. Above the illustration are listed a few of the features which, built into this smooth-working trouble-free, profit-making unit, have helped make it popular around the world:

Other HANSON products: Yard & Dock Cranes -- Truck Shovels -- Heavy Duty Machinery Trailers.

HANSON

CLUTCH AND MACHINERY COMPANY - TIFFIN, OHIO

Evans Joins "Caterpillar"

R. D. Evans

Robert D. Evans has joined the sales development division of Caterpillar Tractor Co., Peoria, Ill., as civil engineer consultant on earth-moving equipment and its applications. He comes to "Caterpillar" from R. G. LeTourneau, Inc., where he functioned as chief field engineer. During the war Mr. Evans acted as liaison between the Corps of Engineers, U. S. Army and the LeTourneau company. Mr. Evans was employed as an engineer for several large construction companies before joining LeTourneau in 1940.

Opens West Coast Branch Factory

Hercules Motors Corporation, Canton, O., has opened a direct factory branch on the West Coast to broaden its program of supplying engines, power units and replacement parts to users, manufacturers and dealers throughout the western part of the country. W. W. Cromley, Vice-President in charge of West Coast operations, is located in Los Angeles and is in direct charge of Hercules activities west of the Rocky Mountains. He is assisted by Oliver Kelly, Herbert Wirshing, and Walter Batty, who will handle the sales activities to manufacturers, dealers and to the retail trade. Headquarters are in Los Angeles, at the factory branch which is located at 2065 East 37th St.

LeTourneau Sales Changes

W. B. Worden

W. B. (Bill) Worden, district sales and service representative for R. G. LeTourneau, Inc., Peoria, Ill., in Southern California and Arizona for the past four years, has been named central sales manager for the company. In this position he succeeds M. E. (Cap) Miller, who resigned to become sales manager for the Rozier-Ryan Co., LeTourneau Distributor in St. Louis, Mo. Bill Worden, before joining LeTourneau, was district representative and acting sales manager for 8 years with Kay-Brunner Steel Products Co., Inc. The new LeTourneau central sales manager's headquarters is at Peoria. Mr. Worden will supervise activities of LeTourneau district representatives in approximately 20 mid-western states between the Canadian and Mexican borders.

H. F. Stenstrom

LeTourneau also has announced the recent appointment of Harold F. Stenstrom as district sales representative, with headquarters at Memphis, Tenn. He is serving Le Tourneau Distributors in Missouri, Tennessee, Arkansas, Louisiana and Mississippi. Mr. Stenstrom worked for Diamond Iron Works, Minneapolis, was with the research and parts departments at Caterpillar Tractor Co., and worked for Standard Oil as lubrication engineer. He has been associated with several large contractors and worked on construction of the Iowa Ordnance plant.

•

A. E. Holcomb Is Dead

A. Elton Holcomb, 68, widely known in the power shovel and crane industry for more than 40 years and former crane and shovel division sales manager for the Koehring Co., Milwaukee, Wis., died in Indianapolis, Ind., Oct. 5. Mr. Holcomb had been in ill health for a number of years. Mr. Holcomb has been active in the industry since 1905 and has been with Koehring since 1919. Before joining Koehring, he had been with Bay City Industrial Works, Bucyrus-Erie, Clyde Iron Works and F. C. Austin Co., and had been active as a private excavating contractor.

SMOOTHER SURFACES—surface variations as much as 50% lower!

FASTER—fewer trips do the job—users claim one 3-axle tandem is the equivalent of two other rollers!

GREATER COMPACTION—surface densities appreciably higher than with lighter rollers.

Remember, Buffalo-Springfield makes *the only true 3-axle tandem* with two equally large diameter steerable guide rolls. Ask for literature.

THE STANDARD OF COMPARISON

BUFFALO SPRINGFIELD

SPRINGFIELD, OHIO, U.S.A.

Changes Manufacturing Setup

A complete new setup in the manufacture of its diesel engines has been announced by Lister-Blackstone, Inc., Milwaukee 3, Wis. All production has been moved to a new modern plant equipped with the most up-to-date tools and machines. A departure from its past policy will be an almost complete concentration on the production of straight diesel engines. While there will be some adaptations—such as power takeoff and irrigation pump outfits and possibly marine propulsion units—no diesel generator sets or combination auxiliaries will be produced. To streamline its parts service a complete, new modern parts department has been established at 1568 W. Pierce St., Milwaukee. All business will be transacted from a new, downtown office at 740 N. Plankinton Ave., Milwaukee 3, Wis.

New Eastern Sales Manager

H. H. Landis has been appointed eastern division sales manager for the Joyce-Gridland Co., Dayton, O., manufacturer of Joyce Jacks and lifts. He will work out of the Dayton office.

Appointed General Sales Manager

G. V. Leece, Vice-President of Gardner-Denver Co., has been appointed general sales manager for the company. He joined the Gardner-Denver Co. in 1922. For the past two years he has been vice-president in charge of the Export Division with offices in New York City. For five years previous he was district manager of the New York branch office and for seven years prior to this period he had been Pacific Coast manager. Mr. Leece, who is also a Director of Gardner-Denver Company, will now be located in the company's plant at Quincy, Ill.

New FWD Distributors

The Four Wheel Drive Auto Co., Clintonville, Wis., has announced the appointment of the following new distributors: Southern Equipment Sales, Ltd., 980 South State St., Jackson, Miss., for the southern part of the state of Mississippi; Illinois Road Equipment Co., 1310 East Jefferson St., Springfield, Ill., for the central part of Illinois; Boyce-Curran Machinery Co., Inc., 2330 Florida Blvd., Baton Rouge, La., in southern part of Louisiana.

Milne Goes to Heil Atlanta Office

Alec Milne

Ray Long, sales representative for road machinery, bodies and hoists for The Heil Co., Milwaukee, Wis., in District No. 3, has resigned to go with Southern Equipment Sales Co., Greenville, and Columbia, S. C., as vice-president in charge of sales. Alec Milne, former national accounts representative working out of the Detroit office, replaces Mr. Long. Mr. Milne will handle sales of bodies and hoists and tanks out of the new Atlanta office under District Manager Jack Davies. Both Davies and Milne have served overseas for the army. Davies has been with Heil for over 20 years. Milne is also well acquainted with Heil products.

New Davey Distributor

Metal Manufacturing Corp., 30th and Garland, Louisville, Ky., has been appointed Kentucky distributor for all products manufactured by Davey Compressor Co., Kent, O.

NOW is the Time To Switch To BARNES

"33,000 for 1" Pumps

SOME USES FOR BARNES PUMPS

Dewatering jobs, building foundations, pipe lines, subways, dams, canals, sewers, manholes; bridge piers; road repairs, drainage and maintenance; water supply for concrete mixing and road building.

MORE and more contractors, constructors, builders and engineers are coming to realize the economy and dependability that go with Barnes Automatic Centrifugal Pumps. For Barnes Pump users get "33,000 for 1" performance — 33,000 gallons of water quickly and efficiently pumped for each gallon of gasoline consumed.

Barnes users, too, get the benefit of Barnes precision engineering and close tolerance machining which make possible direct flow within the pump. There is no inner water maze to cause increased friction and lessen suction power or discharge pressure. The suction inlet is in direct line with the impeller to reduce flow friction and eliminate unnecessary labor of the power unit. Low fuel consumption and high dependable performance result, for in all Barnes Automatic Centrifugal Pumps water takes the natural, direct flow route.

For sale by leading distributors in all principal cities. If there is no distributor near you, write, phone or wire.

BARNES MANUFACTURING CO.

Quality Pump Manufacturers for 50 Years

MANSFIELD, OHIO

Sharpe Elected Vice President

Clifford A. Sharpe has been elected vice president in charge of manufacturing of Gar Wood Industries, Inc. Mr. Sharpe, who became works manager of the company in May, has long been associated with Charles W. Perelle, president of Gar Wood, and was his assistant when Mr. Perelle was vice president in charge of manufacturing for Consolidated Vultee Aircraft Corporation. Mr. Sharpe will supervise Gar Wood's manufacturing operations in Detroit, Wayne and Marysville, Mich.; Mattoon, Ill.; Findlay, O.; Newport News, Va., and St. Paul, Minn.

•

New Timken District Manager

Russell P. Proffitt, since 1933 Chicago Divisional Manager of The Timken Roller Bearing Co., Canton, O., has been transferred to the Washington (D. C.) office as district manager. Proffitt, a mechanical engineer, began his career with Timken in 1923 in the Huntington, W. Va., office. Prior to his joining the Timken organization, Proffitt spent several years with the American Car and Foundry Co. of Huntington, W. Va., in the design of railroad and mine car equipment. Before that, he had served in Ordnance Plants and Navy Yards as a tool-maker and designer during the First World War.

•

New Sales Manager for Richkraft

J. J. Fitzpatrick

John J. Fitzpatrick has been appointed general sales manager for The Richkraft Co., Chicago, Illinois. Mr. Fitzpatrick is a graduate of the University of Illinois School of Architecture, Class of 1932, and has since been in building and construction work continuously. At present, Mr. Fitzpatrick is a licensed professional engineer in Illinois. Previous positions held include field engineer and district office engineer for the Portland Cement Association; and special representative and engineer for the Marquette Cement Manufacturing Co., Chicago.

Appointed to International Research Department

Karl O. Schreiber, vice president, manufacturing, International Harvester Co., has announced the appointment of J. W. Armour, former works manager of the company's Springfield, O., motor truck plant, as assistant manager of Harvester's Manufacturing Research Department.

Mr. Armour began his employment with the company at the Hamilton, Ont., Works in 1910 and held many positions of increasing responsibility in the manufacturing field until he was appointed assistant superintendent at McCormick Works in 1940. From there, in 1942, he went to Springfield Works as works manager.

•

Appointed Field Engineer

Philip X. Navin has been appointed field engineer for the New York district of Goodyear Tire & Rubber Co. This is a new post in the district field organization. Navin will supplement the work of company engineers in Akron. His headquarters will be in New York City. This district engineering post is the third of a series being established by Goodyear.

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Today's battle, in peace as it was in war, is one of "movement". That's where EWC wheels fit into your postwar business picture.

EWC Wheels

Over half a century of "know-how" in designing and building wheels of every conceivable type is your guarantee of the right wheel for the right purpose. Make "ELECTRIC" your source of supply.

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Write today for illustrated Bulletin and details on EWC wheels. No obligations.
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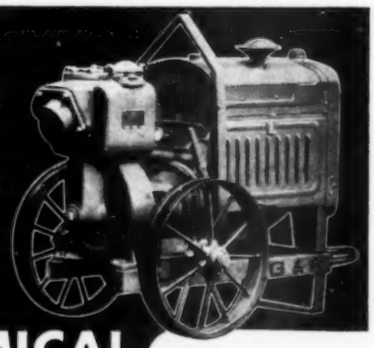
SIMPLE STURDY *and* ECONOMICAL



Gorman-Rupp centrifugal pumps will save time and money on any pumping job. Their simplicity of design and rugged construction insures trouble free performance. They will pump as much or more water for more continuous hours than any pump on the market. Your nearest distributor will assist you in choosing a Gorman-Rupp pump to fill any requirement.

Order a Gorman-Rupp self-priming centrifugal pump from your distributor, put it on the job for thirty days. If it isn't the best pump you ever used we will take it back and it won't cost you a cent.

THE GORMAN-RUPP COMPANY
MANSFIELD • OHIO

International Harvester Changes

International Harvester Co. has announced that Monroe Rooks, former motor truck branch manager at New Orleans has been transferred to the Birmingham general line branch in the same capacity. Mr. Rooks will replace P. H. Baker, former manager at Birmingham who will establish his own dealership at Macon, Ga., handling International Harvester equipment. R. F. Solberg, former assistant manager of the Harvester Company's order and distribution department has resigned to engage as an International Harvester dealer at Elk Point, S. Dak.

New Davey Distributors

The Textile Oil Co., 8 Spartanburg St., Greenville, S. C., has been appointed distributor for Davey compressors. They will represent Davey in the following counties in South Carolina: Greenville, Oconee, Anderson, Spartanburg, Laurens, Newberry, Greenwood, Pickens.

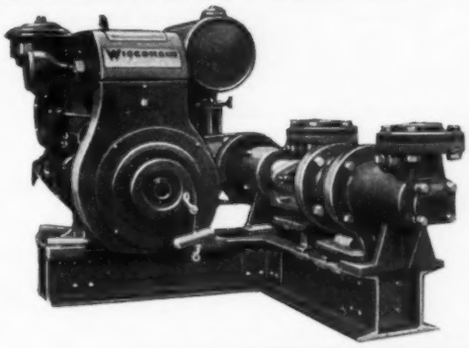
Brock Tractor Company, 1231 Seneca St., Buffalo, N. Y., has been appointed distributor of Davey compressors for the New York counties of Niagara, Orleans, Monroe, Wayne, Erie, Genessee, Livingston, Ontario, Wyoming, Chautauqua and Cattaraugus.

D. W. Lehti Named President

D. W. Lehti

David W. Lehti has been elected president (effective Jan. 1, 1947) of Link-Belt Speeder Corporation, Cedar Rapids, Ia., and Chicago, Ill. He succeeds Troy M. Deal, who is retiring March 1, 1947. Mr. Lehti first became associated with the company as a distributor in 1925. He joined the Speeder Machinery Corporation as a district representative in 1934 and, after a few months, was made chief engineer of the Cedar Rapids plant. Upon the consolidation of the Speeder Machinery Corporation and the Shovel and Crane Division of Link-Belt Co. in 1939, he was promoted to assistant

WISCONSIN Air-Cooled Engine Powers "Donkey Pack" Portable Pumping Unit



Typical of the many diversified applications of Wisconsin Air-Cooled Engines in engineering service is the unit here illustrated . . . designed for use in the Andes Mountains of South America, for pumping drilling mud on a geophysical shot hole drilling rig. It is so designed and constructed that it can be readily disassembled in three sections and transported by donkeys. A structural aluminum frame was used . . . and a Model AEH 4-cycle, single cylinder Wisconsin Air-Cooled Engine was selected for operating the Model B4-4 Moyno Pump . . . based on such vital considerations as light weight, extreme compactness, heavy-duty dependability and complete adaptability to trouble-free operation in any locality, at any altitude.

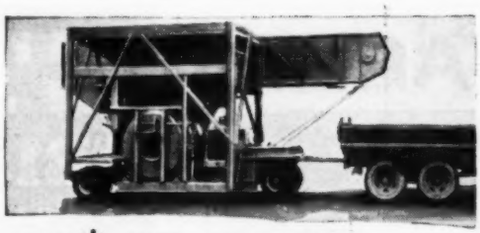
It pays to specify "Wisconsin Engine" for *your* equipment.

Most H.P. per pound

WISCONSIN MOTOR Corporation

MILWAUKEE 14, WISCONSIN, U. S. A.

World's Largest Builders of Heavy-Duty Air-Cooled Engines



30* CU. YD-HR PORTABLE CONCRETE PLANT

Write for Data

CAPACITY OF PLANT
Up to 30 cu. yd/hr depending on mixing time.

CAPACITY OF MIXER
Full 3/4 cu. yd. with 10% surcharge capacity.

CAPACITY OF BIN
20 Cu. Yd. heaped 3 equal compartments.

CAPACITY OF AGGREMETER
Full 3/4 cu. yd. with suspension type scale.

CAPACITY OF ELEVATOR
60 Tons/HR handling material weighing 100 lbs. per cu. ft.

OPERATING CONTROLS
All Mixer Bin and AggreMeter Gates hydraulically operated with control levers banked at operator's position.

* 40 Cu. Yd/HR Plant also available.

STRAYER *Portable* CONCRETE PLANTS

Erie Steel Construction Co., 366 Geist Rd., Erie, Pa.

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A 10 FT. LOAD ON AN 8 FT. TRAILER

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Swing them out for loads wider than 8 ...; swing them back when the load is delivered ...id return quickly with a trailer of a width that is legal in every state.

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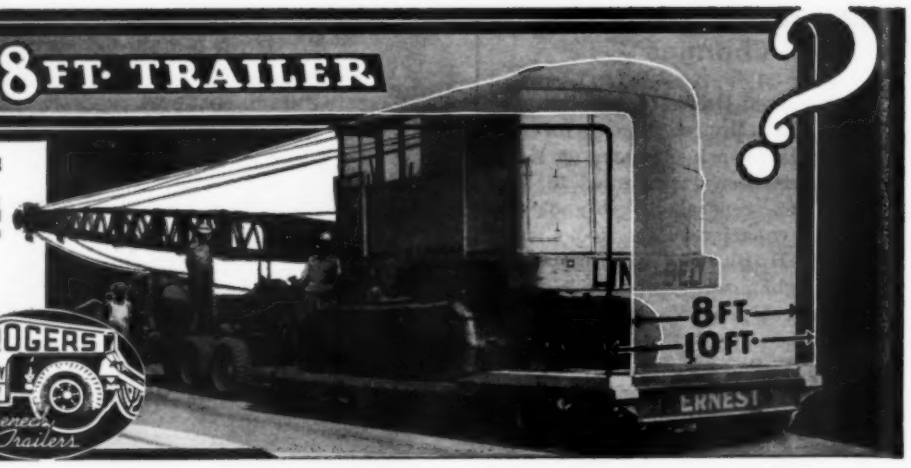

EXPERIENCE *builds 'em*
PERFORMANCE *sells 'em*

ROGERS HEAVY DUTY Gooseneck Trailers

general manager of the newly formed Link-Belt Speeder Corporation at Cedar Rapids. He was elected vice president in 1942. Troy M. Deal became associated with the Speeder Machinery Corporation in 1922, when they were located in Fairfield, Ia. With G. T. Ronk, the founder and Walter Baker, he helped to develop this young company. Mr. Deal was sales manager from the beginning and, in 1933, became president and general manager. In 1939, he became president of Link-Belt Speeder Corporation.

Michigan to Study Roadside Control

The Planning and Traffic Division of the Michigan State Highway Department has initiated a program concerning land use planning and traffic engineering as it relates to roadside control. The sum of approximately $32,000 is proposed for the period July 1, 1946, to June 30, 1947, by the Michigan State Highway Department, to finance such a roadside control study as a highway planning project. In order to execute properly the contemplated project, a special "Roadside Control" unit has been designated in the Traffic section, under traffic design, of the Planning and Traffic Division.

•

Plans are completed for Federal Aid and State highways and highways in national forests and other Federal areas estimated to cost $754,000,000 and aggregating 14,383 miles, Public Roads Administration reports. Plans are also being prepared for 32,488 miles at a cost of $1,822,000,000.

ON GUARD!

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.. CURVES
.. EMBANKMENTS
.. GRADE CROSSINGS
.. BRIDGE APPROACHES
with
TUTHILL GUARDS

TUTHILL Highway Guard has that combination of features Highway Engineers like so well: A high degree of *safety, easy installation* and *low upkeep expense.* Made of strong steel, with panels cut to convenient length, this Guard is easy to install. Its strength to resist impact, and yet stand erect, means greater safety, besides a neater-looking, more permanent job. Proof? The hundreds of TUTHILL Guards along America's scenic highways. Available for maintenance or installation. *Write for details.*

Pacific Coast Manufacturers and Distributors:
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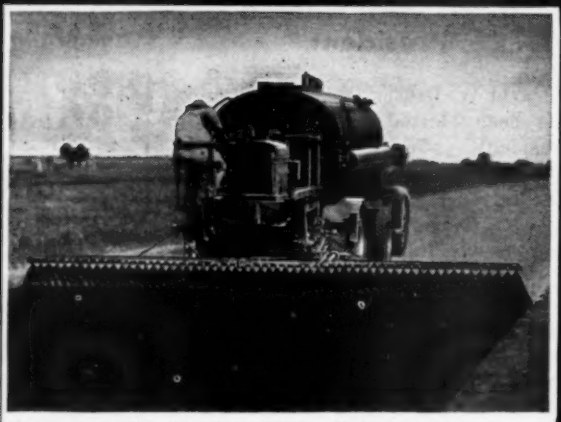
ETNYRE
"Black-Topper"
BITUMINOUS DISTRIBUTORS



Accurate distribution, Dependable performance

Minimize maintenance, save time, reduce labor costs by accurately covering roads up to 24 feet wide in one trip with a dependable Etnyre "Black-Topper." See your Etnyre dealer or write us today for complete details.

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Get a Line on an Owen!

OWEN CLAMSHELL BUCKETS INSURE A BIGGER DAY'S WORK

with a MOUTHFUL AT EVERY BITE

For faster digging, ease of handling on difficult jobs and lowered operating costs, "get a line on an Owen Bucket".

Owen designs and builds to meet your every general or specific requirement.

The workings of an improvement-conscious engineering department are evidenced in field performance everywhere on dredging, excavating and material handling jobs.

Write FOR THE NEW CATALOG

The OWEN BUCKET CO. 6070 BREAKWATER AVE. CLEVELAND, OHIO BRANCHES: New York, Philadelphia Chicago, Berkeley, Calif.

Selection, Duties, and Salaries of Deputy County Surveyors

By Alfred Ellison
County Surveyor
Delaware County, Indiana

THIS subject is rather difficult to discuss for I feel that each county surveyor has problems that no other surveyor would have. The working conditions are never the same in any two counties.

The most important thing to consider in selecting a deputy would be his qualifications. I feel that a deputy should be a graduate engineer or one who has had enough experience to handle the job. In Delaware County most of our work is drainage, so the deputy should know quite a bit about drainage. By drainage I mean tile, dredging, and run-off drainage. Of course, you can take a man who knows the fundamentals of engineering and soon teach him the fundamentals of drainage. For the next five to ten years there will be more drainage problems than there have been in the last ten or twenty years. In our county, ditches have been neglected and are in a terrible condition. Most of the tile drains are from 40 to 60 years old and are ready for replacement. However, with the end of the war, the county and townships are planning on quite a building program, such as bridges, roads, school buildings, so no doubt the surveyor will be called on to help out with these projects. A good deputy should be in a position to handle such engineering problems.

A good deputy should have a mind of his own and should be able to make decisions. This, of course, is up to the surveyor as some will place more responsibility on their deputies than others. A deputy should be a fair diplomat and know how to meet the public and how to handle them. A poor deputy can ruin the reputation of a good surveyor. Of course it is taken for granted that a deputy should be neat in his work and appearance.

In selecting a deputy some of the above mentioned qualifications may have to be sacrificed. Other things enter into the picture, such as politics and sometimes personal feelings. It is only natural that politics be considered, for after all the surveyor's job is a political job and most men want to be re-elected. The best politics for a surveyor is to do his job well and have a deputy who will do the same.

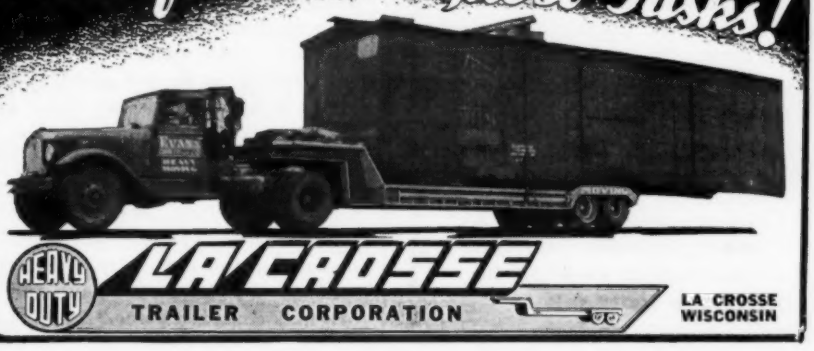
It is necessary for some surveyors to go out of their county to select their deputy, as there are none available in the county. In that case politics can be ignored and you won't receive any criticism from the central committee. The selection of a deputy simmers down to the judgment and desires of the surveyor.

The duties of a deputy are practically the same as the duties of the surveyor. The deputy should have charge of most of the field work, with the surveyor helping, advising and planning. I would want my

Paper given at 32nd annual Purdue Road School.

SUPER STRENGTH for the Toughest Tasks!

The La Crosse Trailers powerful combination of rugged 6 x 6 H beam axles, alloy steel spindles and cast steel wheels possessing twice the strength of malleable wheels gives that extra protection when the job calls for carrying unevenly distributed loads.



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Shunk Snow Plow and Ice Removal BLADES
Proved record of superior performance. Made of specially developed steel to withstand severe service conditions.
FOR ALL TYPES AND MODELS OF SNOW PLOWS
Various widths, lengths, thicknesses--flat or curved--standard or special--punched ready to fit your machine.
SHUNK SAW-TOOTH ICE BLADE
Amazingly effective. Thoroughly breaks up and removes heavy, slippery ice and snow formations. Replaces all types of snow plow blades or maintenance units. Write for Bulletin and name of nearest Distributor.

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Standard Specification for Highway Bridges

The 1944 edition of this book is a complete presentation of the specifications adopted by the Association. In four main Divisions, with 72 subordinate Sections, are covered all details of General Provision, Construction, Design and Materials. Four Appendices carry tables of moments and shears, steel column formulas and graphs, a chart of truck, train and equivalent loadings and a diagram of permissible unit stresses for rectangular concrete columns.

262 pages, 6" x 9", cloth bound, $2.00 post paid.

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deputy to go ahead as if I wasn't there and be able to make some decisions of his own. I would want him to do his work in such a manner that if he was not a licensed engineer, I wouldn't hesitate to place my official seal upon his work.

The salary of a deputy is controlled to a certain extent by law. There is some leeway in the salary, the law says from $125 to $400 per month and these figures vary according to the population of the county. The biggest problem we have is getting the County Commissioners and County Council to approve the salary and appropriate the money. The salary of a deputy in these times should be high enough that you can demand and get a good deputy.

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Kentucky Rules on Delayed Equipment Delivery

Equipment suppliers who bid on new machinery for the Kentucky department of highways and fail to deliver within a reasonable time may be excluded as bidders on future contracts, J. Stephen Watkins, Commissioner, has announced. The statement followed a report of William J. Crouse, new head of the department's division of equipment showing that several equipment dealers were delinquent as much as a year in delivery of patrol graders, bulldozers and other necessary maintenance equipment.

"We will recognize legitimate excuses but do not intend to stand idly by and see equipment dealers sell equipment to others when it has been contracted for delivery to us," the commissioner said. We now have nearly 100 patrol graders on order. These orders were placed in accord with law with the low bidder. Only a small proportion of the graders have been delivered to us, although reports reach us daily that the bidders have sold graders to others.

"Not alone may these dealers be barred from future bidding but I have instructed the assistant attorney general to investigate and establish cause why the contracts have not been filled. Almost every maintenance foreman in the state is begging for graders and other equipment with which to do his work. We are going to resort to every legal effort to obtain this machinery, and bidders who have contracts must either deliver or we will go into the open market and buy. We will then institute suit against the contract dealer for the difference between the amount we have to pay and the original contract price."

DIG and HAUL ..at low cost

Sauerman Drag Scraper and Portable Gravel Plant

PROFITS in digging and hauling sand, gravel, clay, blasted rock, etc., depend on using the simplest equipment that will handle the required yardage in the shortest space of time. In many cases a Sauerman Power Scraper or Slackline Cableway alone meets all these requirements.

The Sauerman system of moving materials adapts itself to any ground conditions and provides fast handling with one-man operation on hauls up to 1,000 ft. or more.

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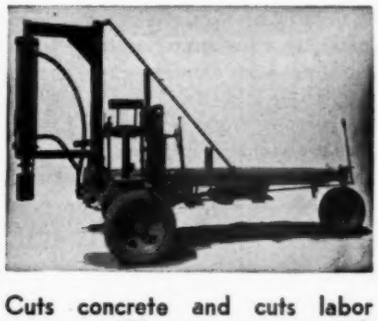
RAPID!



Cuts concrete and cuts labor costs to 2½c per square yard. Applicable to floor work and different types of inside horizontal work.

Very efficient in maintenance work of highways.

Boom folds down and readily trailed by any light truck. Make your compressor treble its output by hooking it to this machine.

Rapid Pavement Breaker Co.
1517 Santa Fe Ave.
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NOW AVAILABLE
One-man Diesel Valve Spring Tool
SAFE-N-EZY
Valve Spring Depressor
CUTS Diesel Maintenance COST!
Patents Pending
Write Today for Prices and Folder
The SAFE-N-EZY Valve Spring Depressor is designed for one-man operation in dismantling and assembling Diesel engine valves. Compresses valve spring to any point, holds it there. Mechanic can have both hands free. Easy to apply. Sizes to fit all modern Diesel engines. Rugged, light, easy to store. Makes Diesel valve dismantling and assembly safe, easy, quick.
PAXTON
DIESEL ENGINEERING COMPANY
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Traffic Gard
The Practical, good-looking Beacon for Fixed Position
KEEP TO THE
EMBURY WARNING LANTERNS
LITTLE AIR PILOT
The General Purpose Warning Light
Order through Your Jobber
EMBURY MFG. CO., WARSAW, N. Y.

Notes on Employee Safety

The premium rate for construction accident insurance to employees of the Pennsylvania department of highways has lowered slightly, from .9364 and .9063 in the years ending May 31, 1944 and 1945 respectively, to .8707 in the year just past. As a result of a state-wide safety effort the number of compensable accidents in the past year was reduced to 82 and compensation costs were decreased $14,683 to $122,500. Safety efforts under a safety director are carried out through five advisers patroling the state's eleven highway districts. Four safety meetings a year are held in each county. Complete first-aid equipment and such safety equipment as goggles, etc., are provided.

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State Rents Equipment from G.I.'s

More than 40 bulldozers, angle dozers, patrol graders and other heavy equipment needed for work on rural highways in Kentucky are being rented from ex-service men, according to J. Stephen Watkins, highway commissioner. The G.I.-owned equipment was purchased through priorities with the War Assets Administration. Rentals on bulldozers net the G.I. from $7.50 to $12.00 per hour, and in many cases have been continuously used for as much as 200 hours.

While it has been the practice to rent equipment from contractors and counties for this work, this is the first year the Kentucky department has been able to obtain individually owned heavy road machines. In a great many instances, the G.I.-owner was employed to operate his own machine.

•

Rail-highway accident figures for 1945 give the total such accidents as 4,100 resulting in 1,903 deaths, according to the Interstate Commerce Commission. Non-fatal injuries numbered 4,446. The fatalities represent 42.62% of all deaths connected with train operation. Passenger vehicles were involved in 63.17% of the accidents. In 63.27% of the accidents, the crossings were not protected by lowered gates, watchmen, audible signals or visible signs indicating the approach of trains. (Highway Research abstracts.)

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"Soil-Bituminous Roads"—Current Problems Bulletin No. 12 of the Highway Research Board. A 52-page summary, the most complete and up-to-date on the subject; chapters on soil-bitumen, sand-bitumen, waterproof mechanical stabilization, oiled earth surfaces; Purpose of bulletin "to disseminate in practical form the best current information.

SAVE $ and INCREASE TRACTOR POWER
The Bulldozer Blade Nu-Edge Bar is butt-welded to new or worn blade and welding bead covered with a thin layer of hard-surfacing electrode—Affording 2,000% savings in blade replacements.

BULLDOZER TRACTOR GRIP-LUGS are easily welded to any size grouser shoe without dismantling assembly. Made of special work-hardening steel which becomes tougher with use — outwearing original grouwer.
See Your Local Dealer
Send for Folder RS Today.
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ALLIED STEEL PRODUCTS, INC.
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ICE CONTROL

THE BURCH CHIP-IT-OVER
Three hooks suspend this machine from back of any standard truck body—each hook controlled by its own winch. Mounted in 2 minutes!
Spreads any ice control material, evenly, economically. Spinner operated by independent Briggs & Stratton gasoline motor. All shafts and gears enclosed and lubricated. Speed of spinner and material flow can be controlled. Useful the year-'round!
Write for bulletin and prices.
THE BURCH CORPORATION
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CLEARING HOUSE

FOR SALE
CLIMAX GASOLINE ENGINES

NEW — model V-425, 12 cylinder 425 H.P. at 1200 RPM, gasoline engine power unit complete radiator to twin disc clutch inclusive with gasoline starting engine. Cheaply convertible to natural gas operation. Priced far below factory list, 7 units available. Dealers invited.

THE FINN EQUIPMENT COMPANY

2525 Duck Creek Road
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Phone East 1125

FOR SALE

1—Foote Paver	$3,000.00
1—Huber Roller, Gas, 10-ton —3-wheel	1,250.00
3—Steam Tandem Rollers (Prices vary)	
1—Barber-Greene Ditcher	2,500.00
2—Drott Universal Bull Clam Shovels (New), each	500.00
1—Buckeye Sub Grader, 10' to 12'	3,250.00
1—Iroquois Asphalt Plant 2,000 lb. box	15,000.00

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2 — 25 to 50-TON CAP. PORTABLE CRUSHING PLANTS COMPLETE — GAS OR DIESEL.

THE DARIEN CORP.
DARIEN **CONN.**

RARE DECORATION

STEER HORNS For Sale over SIX FOOT spread. Polished and mounted. Fine decoration for home or office. Rare opportunity, Texas Longhorn cattle now extinct. Free Photo. Lee Bertillion, Palestine, Texas.

TRANSITS and LEVELS

New or Rebuilt
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Headquarters for REPAIRS—any make. Factory service. We will also *buy* your old instruments or take them in *trade*.

A complete line of engineering Instruments and Equipment for Field or Office. Write for Bulletin RS-112.

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Manufacturers of Sterling Transits and Levels
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NEW EQUIPMENT — IN STOCK FOR IMMEDIATE SHIPMENT

New *"CONTINENTAL"* Engines, complete with Clutch. 8 to 40 h.p. Also, complete stock Parts.
New *"LULL"* SHOVEL-loader, Hydraulic controlled, ½-yard bucket, 8'-6" dumping hgt. on *"M-M"* model RTI Industrial tractor, pneumatic tires.
New *"JOHNSON"* Batching Bin for 34-E Paver. This is the new Twin-Batcher, 3 compt., 100 yards, 150 ton.
New *"RAPID"* Pavement breaker, Junior model, pneu. tires. (Takes 210 ft. Air Compressor.)
New *"LITTLEFORD"* Tar and Asphalt Kettles, 165 gallon with gas engine & power spray, pneu. tires.
New *"HUBER"* Tandem patch roller, 3 to 4 ton.
New *"HUBER"* Maintainer, with 8' blade and FRONT-END LOADER.
New *"FARQUAR"* Car Unloaders, Gas engine driven.
New *"WHITEMAN"* Floor Finishers and Blades.
New *"JAEGER"* Pumps, all sizes. Also, New Suction Hose, TARPAULINS, HOT WATER HEATERS, CONCRETE MIXER HEATERS, MORTAR BOXES, THAWING TORCHES, *"CLEVELAND"* AIR TOOLS, MOIL POINTS, CHISELS, MASONRY SAWS, BLADES, VIBRATORS.

USED EQUIPMENT BARGAINS, IN STOCK —*WE OWN THE EQUIPMENT WE ADVERTISE*

Used Batching Bin, *"BLAW-KNOX"*, 110-ton, 3 compt., nearly new, used on one small job.
Used Car Unloaders, *"PORTABLE-FARQUAR"* Gas engine driven.
Used Pile Driving outfit, consisting of "THEW" Steam Crane, 40 boom, steel leads, and choice of *"VULCAN"* #2, McK-T #5 or #7 hammers.
Used Sand-Blast Machines, *"PANGBORN"* latest models, 700#.

CALL US *FIRST* AND SAVE TIME, WE'VE GOT THE GOODS.

ARROW CONTRACTORS EQUIPMENT CO.
2020 W. WALNUT STREET
CHICAGO, ILLINOIS
PHONE SEELEY 2040

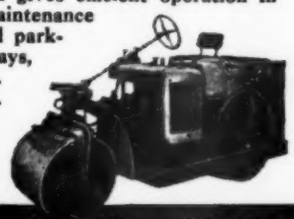
Concrete
VIBRATORS and GRINDERS
Write for Circular on types, sizes and Prices

ELKHART **White Mfg. Co.** INDIANA

Try a **Pierce-Bear** *on that tough job!*

3½ TON — VARIABLE WEIGHTS

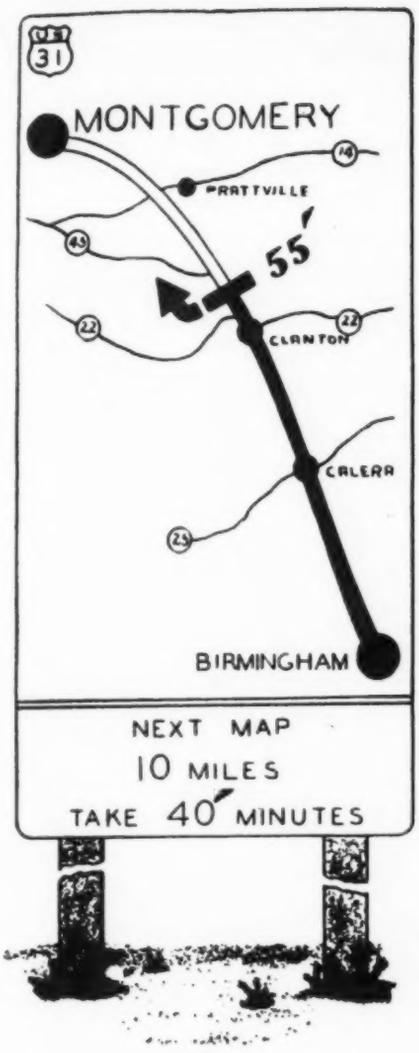
Engineered refinements and rugged strength have earned for these rollers enviable performance records. Compact design gives efficient operation in close quarters. Ideal for maintenance work on highways, airports and parking areas. Fine for driveways, docks, etc. Easy to operate. They do a good job at low cost.

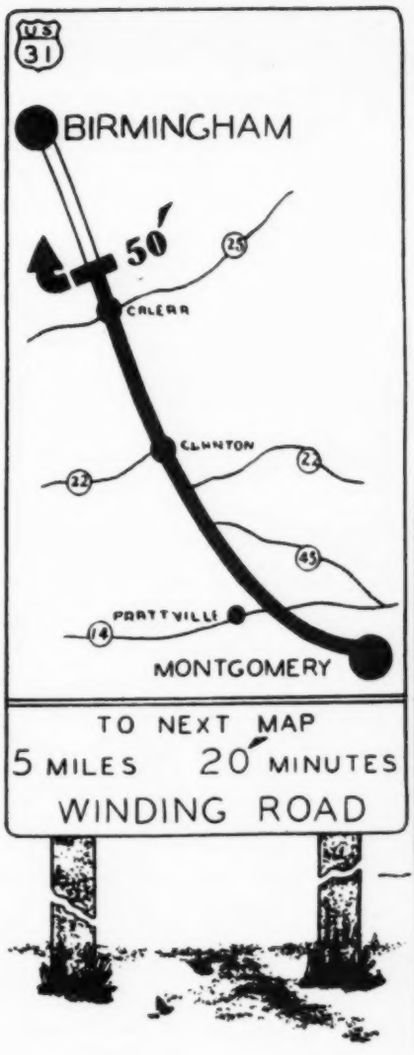


Write for New Illustrated Folder.

MANUFACTURED BY

Lewis Manufacturing Co. P O BOX 500
SAN ANTONIO 6 TEXAS





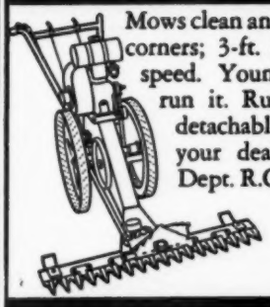
Experimental Signs Tell Motorist How Long to Take

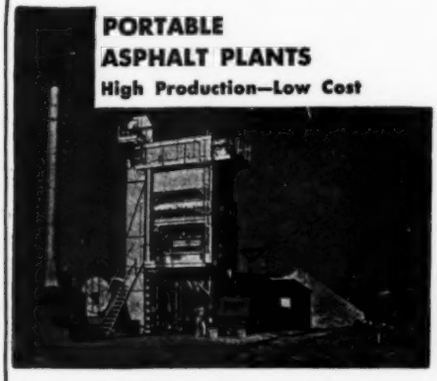
A series of "minute" signs, so called, are being placed on U. S. 31 between Montgomery and Birmingham in Alabama by the state department of public safety. According to safety director Van B. Gilbert, similar signs will be placed elsewhere if these turn out sucessfully.

As shown in the pictured examples, the sign combines a skeleton road map and a lettered statement, informing the driver how long it should take him to safely traverse the section of road ahead of him. The signs were made as a result of time checks by experienced drivers. A careful record of accidents along roads thus posted will be kept and correlated with previous accident records, to check on the results.

Engineer Examination for Federal Positions

The U. S. Civil Service Commission, Washington 25, D. C., has announced an engineer examination for probationed appointments in the Federal Service in all branches of engineering. Positions in the departmental service in Washington, D. C., and vicinity and in the field service in Washington, D. C., and a limited number of positions in the field-service-at-large, will be filled from this examination. The salaries range from $3,397 to $5,905 a year. Full information regarding the examination, and application forms, may be secured at most first- and second-class post offices, from the Commission's regional offices, or from the United States Civil Service Commission, Washington 25, D. C. Applications must be received in the Commission's office in Washington not later than Dec. 3, 1946.

CUNNINGHAM
MOWER

Mows clean and fast in tight corners; 3-ft. cut; variable speed. Young folks can run it. Rugged design, detachable engine. See your dealer or write Dept. R.O.
Fence Rows • Roadsides • Railroads • Farm Lawns
JAMES CUNNINGHAM, SON & CO.
13 Canal Street, Rochester 8, N. Y. Est. 1838

PORTABLE
ASPHALT PLANTS
High Production—Low Cost

THE McCARTER IRON WORKS, INC.
NORRISTOWN, PENNA.

VULCAN PAVEMENT AND CLAY DIGGING TOOLS
ARE MADE in a complete line of sizes to fit all standard compressed air hammers.
Send for NEW Vulcan Illustrated CATALOG today.
VULCAN TOOLS — THE WORLD OVER — NOTED FOR QUALITY AND DURABILITY"
VULCAN TOOL MFG. CO.
QUINCY, MASS.

RELIANCE
CRUSHING, SCREENING and WASHING UNITS
● Up to 2000 Tons a Day ●
Crushers, Elevators, Sweepers, Screens, Wash Boxes, Bins, Pulverizers, Feeders, Spreaders, Kettles, Conveyors, Drag-Lines, "GAYCO", Centrifugal Air Separators
UNIVERSAL ROAD MACHINERY CO.
Kingston, N. Y.
Canadian Representatives: F. H. Hopkins & Co., Ltd 340 Canada Cement Co., Montreal, Que., Can

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Check reference to advertisement or to items of equipment or materials on which you wish to receive information. Give your name and address in the space at foot of page (if convenient, please print or use typewriter), detach page and mail to ROADS AND STREETS, Readers' Service Department, 22 West Maple Street, Chicago 10, Ill. We will pass your inquiry along to manufacturers and see that you get desired information promptly.

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Check other products below on which you wish us to obtain information for you:

AGGREGATE:
- ☐ Bins and Hoppers
- ☐ Conveyors
- ☐ Crushers
- ☐ Portable Plants
- ☐ Screens

BITUMINOUS:
- ☐ Batchers
- ☐ Finishers
- ☐ Distributors
- ☐ Dryers
- ☐ Heaters
- ☐ Plants (central)
- ☐ Plants (travel)

CONCRETE:
- ☐ Batchers
- ☐ Buggies and Carts
- ☐ Finishers
- ☐ Joints, Expansion and Contraction
- ☐ Reinforcement Accessories
- ☐ Metal Road Accessories
- ☐ Mixers (under 1 yd.)
- ☐ Mixers (1 yd. up)
- ☐ Pavers
- ☐ Reinforcing Steel
- ☐ Road Forms (1000' set)
- ☐ Tower
- ☐ Truck Mixers

CRANES:
- ☐ Crawler Mounted
- ☐ Truck Mounted
- ☐ Piledrivers

GRADERS:
- ☐ Blade, self propelled
- ☐ Blade, pull type
- ☐ Blade, under truck
- ☐ Elevating

LOADERS & TRENCHERS:
- ☐ Front-end loader (tractor mounted)
- ☐ Loader, bucket type and belt type
- ☐ Trencher or Ditcher

HAULING EQUIPMENT:
- ☐ Dump Trucks, self-powered
- ☐ Dump Wagons, tractor drawn
- ☐ Flatbed Trailers
- ☐ Other Trucks

PUMPS:
- ☐ Centrifugal
- ☐ Concrete
- ☐ Diaphragm
- ☐ Mud Jacking
- ☐ Piston
- ☐ Wellpoint

POWER UNIT: (Independent)
- ☐ Gasoline
- ☐ Diesel
- ☐ Electric

ROLLERS:
- ☐ Power (Smooth)
- ☐ Pneumatic Tire
- ☐ Sheepsfoot

TRACTORS:
- ☐ Crawler
- ☐ Rubber-Tired

TRACTOR EQUIPMENT:
- ☐ Dozers
- ☐ Power Control Units
- ☐ Rippers
- ☐ Scrapers, tractor drawn
- ☐ Scrapers, self-powered

BUCKETS:
- ☐ Clamshell
- ☐ Concrete
- ☐ Dragline
- ☐ Orange Peel

SHOVELS & DRAGLINES:
- ☐ Crawler (under 1 yd.)
- ☐ Crawler (1 yd. up)
- ☐ Truck Mounted

ROCK DRILLS & AIR TOOLS:
- ☐ Air Compressors
- ☐ Backfill Tampers
- ☐ Clay Diggers
- ☐ Concrete Vibrators
- ☐ Drills, cabel tool
- ☐ Drills, tripod and wagon
- ☐ Drills, rock, hand-held
- ☐ Paint Sprayers
- ☐ Paving Breakers
- ☐ Riveters and Chippers

MISCELLANEOUS:
- ☐ Buildings, portable
- ☐ Earth Drills, power
- ☐ Light Plants
- ☐ Lubrication, Service Truck
- ☐ Mowers, Highway
- ☐ Power Saws
- ☐ Soil Stabilizing Equipment
- ☐ Snowplows, rotary
- ☐ Snowplows, v or wing
- ☐ Spreaders, sand or cinders
- ☐ Street Flushers
- ☐ Street Sweepers
- ☐ Welders
- ☐ Cutting Torches
- ☐ Hydraulic Jacks
- ☐ Hydraulic Control Equipment
- ☐ Hand Tools
- ☐ Hoists, derrick type

Be sure to fill in name and address below:

Your Name ..... Title or profession .....

Name of your company or governmental department .....

Type of work for which equipment will be used .....

Street Address .....

City ..... State ..... County .....

You can tell them by their "DOG-TAGS"

HAZARD'S ACCO Registered Slings are identified

●Every American soldier wore metallic tags which bore his name, number, and military affiliation. Every Hazard Acco-Registered sling wears a metallic tag which shows its size, type, registered number, and its safe working load as pre-determined by a mill-applied load test of *twice* its rated capacity.

Hazard's Acco-Registered sling tags not only identify the sling by name and number, but *constantly* tell your workmen the safe load it will carry. That's a safety precaution that *could* save a lot of money for you.

Get the full story of Hazard's Acco Wire Rope Sling registration and what it means to you, by writing for literature *now*. You will thank us for the suggestion, later.

ACCO

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, San Francisco, Tacoma, Seattle, Bridgeport, Conn.

HAZARD WIRE ROPE DIVISION
AMERICAN CHAIN & CABLE

TRADE MARK

In Business for Your Safety

Tech.

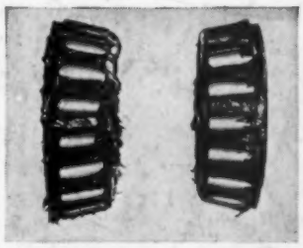
Lower Maintenance Costs Assured

Use a lubricant that protects chassis longer — TEXACO MAREAK. The pictures tell why *Marfak* protection lasts longer. *Marfak* won't splatter under the heaviest blows of a hammer — won't squeeze or jar out of bearings under hammering road shocks, either. It cushions the parts, adds miles to their life.

"Hammer Test" proves Marfak protects parts longer

"Stretch Test" proves Marfak seals out dirt and moisture

And see how *Marfak* s-t-r-e-t-c-h-e-s. Ordinary grease won't do that. But *Marfak* is cohesive. It holds together. That means it seals out dirt and moisture — protects chassis parts for extra thousands of miles.



Marfak Heavy Duty makes wheel bearings last longer

Use a lubricant that adds life to wheel bearings — TEXACO MAREAK HEAVY DUTY. Despite heavy loads and high speeds, *Marfak Heavy Duty* stays in the bearings. It provides fluid lubrication inside, but retains its original consistency at the edges — thus sealing out dirt and moisture, sealing itself in, assuring safer braking. No seasonal change is required.

More than 250 million pounds of Marfak have been used!

For Texaco Products and Lubrication Engineering Service, call the nearest of the more than 2300 Texaco distributing plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO

TEXACO Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT

Tune in . . . TEXACO STAR THEATRE presents the NEW EDDIE BRACKEN SHOW every Sunday night. Metropolitan Opera broadcasts every Saturday afternoon.